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Draft Environmental Impact Statement

Jess Project

**Salmon/Scott River Ranger District, Klamath National Forest, Siskiyou
County, California**

Township (T) 40 North (N) Range (R) 12 West (W), Sections 23-24, 26-28, &
34-36; T40N R11W, Sections 28-33; T39N R12W, Sections 1-4 & 9-12; and
T39N R11W, Sections 4-6, Mt. Diablo Meridian

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**Jess Project
Draft Environmental Impact Statement
Siskiyou County, California**

Lead Agency: USDA Forest Service

Cooperating Agencies: None

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Abstract:

The Jess project, prepared under the Healthy Forest Restoration Act of 2003, documents the analysis and discloses effects of the no-action alternative, the proposed action and one other action alternative. The purpose of the project is to (1) improve defensibility against wildfire to the municipal watershed and nearby communities; (2) improve compositional, structural, and functional attributes of biologically diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease infestation; and (3) provide a broad range of ecosystem services including wood products, rural economic health, biodiversity and beneficial uses of water. Alternative 1 is the no-action alternative and continues the current level of management and use. Alternative 2 is modified from the proposed action as described in the notice of intent to prepare an environmental impact statement for this project. Alternative 3 was developed based on public comment on the notice of intent to prepare this project and on review and input from resource specialists; it is designed to minimize the removal or downgrading of habitat for northern spotted owl and to avoid treatments in riparian reserves.

Comments:

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement (DEIS). This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. *City of Angoon v. Hodel* (9th Circuit, 1986) and *Wisconsin Heritages, Inc. v. Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

The opportunity to comment ends 45 days following publication of the notice of availability (NOA) in the Federal Register.

Send comments to: Patricia Grantham, Klamath National Forest Supervisor, 1711 South Main Street, Yreka, CA 96097-9549, Attn: Jess Project. The preferred venue for submitting comments is through the project website (www.fs.fed.us/nepa/fs-usda-pop.php/?pproject=38943) by selecting the “Comment on Project” link in the “Get Connected” group at the right-hand side of the project webpage. However, comments may also be submitted at the Forest Supervisor’s office (address above, between 8. a.m. and 4:30 p.m. on business days), by facsimile (530-841-4571) or by email to: comments-pacificsouthwest-klamath@fs.fed.us; put the project name in the subject line. Attachments may be in the following formats: plain text (.txt), rich text format (.rtf), Word (.doc, .docx), or portable document format (.pdf).

Summary

The Klamath National Forest (Forest) has prepared a draft environmental impact statement on a proposal to increase defensibility of Sawyers Bar, California against wildfire, to restore ecosystem processes, and to support rural economic health on approximately 8,535 acres in the North Fork of the Salmon River area. This project is proposed under the Healthy Forest Restoration Act of 2003 (HFRA).

This action is needed because epidemic infection rates of dwarf mistletoe in the Douglas-fir and white fir are leading to mortality of these tree species and blister rust is leading to premature mortality of sugar pine. These conditions, in concert with drought, are slowing the recruitment of healthy young trees and the growth of mid-seral stands, as well as contributing to premature death of large, older trees. The community of Sawyers Bar is adjacent to the project area and is considered a community at risk from wildfire. Sawyers Bar Community Wildfire Protection Plan identifies several roads within the project area as emergency access routes that are not safe because of the need for fuels reduction on roadsides. The community's municipal watershed, Jessups Gulch, is also in the project area; it is identified as at risk from wildfire. Many of the residents of Siskiyou County are dependent on resource extraction for economic opportunities and forest products.

The relevant issues identified from public scoping and collaboration efforts are:

- # 1. There was a disagreement about the effects of logging on northern spotted owl habitat and increasing barred owl competition.
- # 2. There was a disagreement about the effects of logging and fuels treatments within Riparian Reserves on canopy cover and wildlife connectivity.
- # 3. A recommendation was made during scoping to add fuels treatment along the Sawyers Bar road.
- # 4. A recommendation was made during scoping for an alternative that retains all large dwarf mistletoe-infected trees.
- # 5. A recommendation was made during scoping for an alternative that retained 60% canopy, excluded Riparian Reserves from treatment, and concentrated on thinning from below in plantations.
- # 6. A recommendation was made during a public meeting for an alternative that would use multiple entries of harvest to meet project goals.
- # 7. A recommendation was made during a public meeting to use smoke from prescribed burning to manage dwarf mistletoe levels.

These issues led the agency to develop alternatives to the proposed action. The alternatives include:

Alternative 1 is the no action alternative. This is the continuation of the current level of management and use.

Alternative 2 is the modified proposed action. This alternative treats about 1,960 acres. This includes 435 acres of ridgetop fuels treatments, 615 acres of roadside fuels treatments, 810 acres of commercial harvest, 130 acres of non-commercial treatments for timber stand improvement, and ten acres of meadow treatments. About two miles of temporary roads on existing roadbeds will be used and hydrologically stabilized at the completion of the project. There are unit-specific treatments recommended for hydrologic

Riparian Reserves intended to meet the Aquatic Conservation Strategy and the Clean Water Act.

Alternative 3 was developed based on Relevant Issues #1 (effects to northern spotted owl habitat) and #2 (effects to Riparian Reserves). This alternative treats about 1,505 acres. This includes 465 acres of ridgetop fuels treatments, 740 acres of roadside fuels treatments, 210 acres of commercial harvest, 110 acres of non-commercial treatments for timber stand improvement, and ten acres of meadow treatments. About two miles of temporary roads on existing roadbeds will be used and hydrologically stabilized at the completion of the project. There will be minimized removal/downgrading of northern spotted owl habitat and no treatments in the hydrologic Riparian Reserves.

The effects of all alternatives on relevant resources are summarized in section 2.5.

Alternative 2 will reduce the number of trees per acre infected with mistletoe compared to alternative 1, improve the project area's defensibility against wildfire, and provide for about 73 jobs. Alternative 2 will not affect nesting or roosting habitat but will remove or downgrade 535 acres of northern spotted owl foraging habitat, treat 60 acres of hydrologic Riparian Reserve and will not affect shade on late-flowing intermittent or perennial streams. The trees per acre infected with dwarf mistletoe for alternative 3 will be less than for alternative 1 but greater than alternative 2. Defensibility of the project area will be improved over alternative 1, and alternative 3 will provide for 17 jobs.

Alternative 3 will not affect northern spotted owl nesting/roosting habitat but will remove or downgrade 15 acres of foraging habitat, and has zero acres of commercial treatment in the hydrologic Riparian Reserves. There will be no effect to shade on late-flowing intermittent and perennial streams.

Alternatives Considered but Eliminated from Detailed Study are to: A) Expand the project to include fuels treatments along Sawyers Bar Road (Relevant Issue #3); B) Retain all large mistletoe-infected trees (Relevant Issue #4); C) Maintain 60% canopy, no treatment in Riparian Reserves and focus on plantation thinning (Relevant Issue #5); D) Use multiple entries of harvest over decades (Relevant Issue #6); and E) Use smoke from prescribed fire to control dwarf mistletoe levels (Relevant Issue #7).

Based upon the effects of the alternatives, the responsible official will decide whether to adopt and implement the proposed action, an alternative to the proposed action, or take no action. At this time, alternative 2 is the preferred alternative.

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Chapter 1. Purpose of and Need for Action

1.1 Document Structure

The Forest Service has prepared this Draft Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Draft Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- **Chapter 1. Purpose and Need for Action:** This chapter briefly describes the proposed action (as presented in public scoping), the existing and desired conditions that drive the need for change, and other purposes to be achieved by the proposal. This section also summarizes how the Forest Service informed the public of the proposed action and how the public responded.
- **Chapter 2. Alternatives, including the Proposed Action:** This chapter provides a detailed description of the agency's modified proposed action as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table comparing the proposed action and alternatives considered in detail with respect to their environmental impacts.
- **Chapter 3. Affected Environment and Environmental Consequences:** This chapter describes the affected environment and environmental impacts of the proposed action and alternatives.
- **Chapter 4. Consultation and Coordination:** This chapter provides a list of preparers and agencies consulted during the development of the draft environmental impact statement. Also included are a list of acronyms and glossary of terms used, literature cited, and an index of page numbers by document topic.
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the draft environmental impact statement.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located on the project webpage at http://www.fs.fed.us/nepa/nepa_project_exp.php?project=38943.

1.2 Background

The Jess project area is about 8,535 acres located mainly in the area surrounding Jessups Gulch which is a tributary to the North Fork of the Salmon River. The project area is about two miles south of Sawyers Bar, California. The legal location is Township (T) 40 North (N) Range (R) 12 West (W), Sections 23-24, 26-28, and 34-36; T40N R11W, Sections 28-33; T39N R12W, Sections 1-4 & 9-12; and T39N R11W, Sections 4-6, Mt. Diablo Meridian. The project is within the Olsen-North Fork Salmon (18010210020801); Shiltos-North Fork Salmon (18010210020706); Jessups North Fork Salmon (18010210020704); and Eddy Gulch (18010210020703) 7th field watersheds. All of these watersheds are within the North Fork Salmon River 5th field watershed. Elevation ranges from 2,400 to 6,000 feet.

Existing Condition

Defensibility against Wildfire

The town of Sawyers Bar is identified as a community-at-risk. According to the Forest Fire Management Plan, the project area lies almost entirely within the area where homes and wildlands intermix which is known as the Wildland Urban Interface (USDA Forest Service 2009). The Sawyers Bar Community Wildfire Protection Plan identifies several of the roads within the project area as emergency access routes (Salmon River Watershed Restoration Council 2004, page 12). The Community Wildfire Protection Plan also identifies the community's source for municipal water, Jessups Gulch, as being at risk from wildfires (Salmon River Watershed Restoration Council 2004, page 9).

The project area is outside of the historic range of variability for fire return intervals, meaning that wildfires in the area have not occurred at as high a frequency over the last 100 years as was true in the past. However, fire modeling predicts that, even during extreme fire weather conditions (90th percentile weather conditions), there is a low probability of severe fire behavior (flame lengths less than four feet) on 75% of the project area. This is due to reduction in fuels due to projects within and adjacent to the project area including the Eddy Gulch Late Successional Reserve Habitat Restoration project, the Glassups Timber Sale and associated prescribed burning. These projects have reduced or will reduce the understory component and potential wildfire flame lengths throughout the North Fork Salmon River 5th field watershed.

There are several existing wildfire control features in the project area along the ridges surrounding Jessups Gulch and the ridgeline surrounding the Blue Ridge Lookout. Many of the manmade features were built during the 1987 wildfire season. These features are in various stages of maintenance. Some small handlines near the Eddy Gulch road have been receiving annual maintenance and are currently in fully-functioning condition. Other areas have had some ladder fuel accumulation and are in need of treatment to be used efficiently during a direct attack on a wildfire.

Stand Health and Diversity

Past fire suppression and other past management activities have led to changes in vegetation species composition and stand structure. The tree stands are so dense that tree growth and vigor are decreasing and the forest's susceptibility to insects and disease is increasing (USDA Forest Service 1995d, pages 3-5). Shade-intolerant species such as hardwoods and pines are no longer successfully regenerating and are becoming less common in the project area. The encroachment of white fir and Douglas-fir is reducing the historically dominant hardwoods, ponderosa pine, and sugar pine in the project area (USDA Forest Service 1995d, pages 3-7). Further, the area's structural diversity is being decreased because of the sizes of opening have decreased by 40% and the distance between openings has doubled (Skinner 1995).

Insects and disease have affected all tree species in the project area. Sugar pines are impacted by blister rust. Dwarf mistletoe can be found in every conifer species at uncharacteristically high infection levels. It is not common to use the term epidemic for a slow moving pest such as dwarf mistletoe but the project area displays the characteristics of an epidemic outbreak of dwarf mistletoe. There are several aspects to consider when

determining if insects or disease are at epidemic levels. These factors are discussed relative to the Jess project area in Table 1.

Table 1. Characteristics of an epidemic infection rate of a forest pest compared to current conditions in the Jess project area.

Characteristics of an Epidemic	Current Conditions of the Jess project Area
Comparison of the Current Levels to Historic or Reference Conditions	Douglas-fir and white fir in the project area have an infection rate of dwarf mistletoe that is uncharacteristically high when compared to similar forest types in the area and historically. (USDA Forest Service 2013 and Silviculture Report)
Observed Rates and Extent of Population Increase and/or Spread	Tree rings showed a marked reduction in size over about the last 20 years indicating a reduction in growth. This is most likely a result of the stress of drought, inter-tree competition and an increase in dwarf mistletoe infection rates. Trees that are being highly affected by dwarf mistletoe (broom volume ratings of 4-6) are common in the project area. Mallams (2007) found in southwest Oregon 11% of trees with a broom volume rating of 5 and 45% of trees with a broom volume rating of 6 died within ten years (USDA Forest Service 2013). There is evidence of dwarf mistletoe in every major conifer species in the project area, indicating that several species of dwarf mistletoe are present (Silviculture Report).
Species Composition, Age and Size of Trees in Stand	The overstory trees are surrounded by smaller, younger trees of the same species. This lack of species diversity at the small scale perpetuates the uncharacteristically high dwarf mistletoe rate in the project area. The Douglas-fir and white fir in the project area are under added stress due to the impacts of the widespread and severe levels of their respective dwarf mistletoes, which is causing mortality in all sizes of these trees. Continued infection of younger understory Douglas-fir will limit the ability for them to grow into large old trees that will survive for many decades (USDA Forest Service 2013).
The Stand Density or Stocking Levels	It is obvious that the trees in the Jess project area are under a great deal of stress, due to the combined effects of high density and drought. (USDA Forest Service 2013). Stand Density Index is a relative measure of stocking levels expressed as a number of ten-inch diameter trees per acre. Since all the stands are above 55% of maximum Stand Density Index, mortality is occurring and fuel loading is increasing. As stand densities increase, the effects of inter-tree competition will intensify (Silviculture Report).
Climate Change Impacts	The trees in the Jess project area are under a great deal of stress, due to the combined effects of high stocking and drought (USDA Forest Service 2013). The addition of the uncharacteristically high dwarf mistletoe infection rates makes the project area less resilient to the stresses that are added due to climate change.
Disturbance Events such as Drought, Wind, Snow, and Ice Storms	The area is entering its third year of drought which increases the inter-tree competition for water and decreases the ability of trees to survive the effects dwarf mistletoe infection.

Meadow Function

Meadow habitats within the project area are underrepresented. Existing wet meadows support populations of spiny-tail fairy shrimp (*Streptocephalus sealii*) while providing big game forage opportunities. Due to fire suppression, conifer species are encroaching into meadow systems, reducing the size and quality of meadow habitats (Forest Plan, page 4-32).

Rural Community Health

The local community uses fuelwood as the primary source of heating (USDA Forest Service 1995d page 6-2). The municipal watershed for Sawyers Bar, California is in the project area. There are limited opportunities for employment in the North Fork of the Salmon River. Most residents are dependent on resource extraction (USDA Forest Service 1995d, page 6-2).

Desired Condition

The desired condition is derived from the Forest Plan (USDA Forest Service 1995a), the North Fork [Salmon] Watershed Assessment (USDA Forest Service 1995d) and the Sawyers Bar Community Wildfire Protection Plan (Salmon River Watershed Restoration Council 2004).

Defensibility against Wildfire

Low fuel loadings will be maintained or reduced in the North Fork Salmon River watershed (USDA Forest Service 1995d, page 6-4). Ultimately, the existing condition will be maintained where direct attack of a wildland fire can take place. This includes conditions where low flame lengths (less than four feet) are predicted. Wildfire will be able to be managed in the watershed while protecting valuable forest resources and the intermixed communities (Forest Plan, page 4-52). The Community Wildfire Protection Plan recommends that fuels be reduced above and below the emergency access roads in the project area (Salmon River Watershed Restoration Council 2004, pages 9-10). The Community Wildfire Protection Plan also recommends the municipal watershed be defensible against wildfire (Salmon River Watershed Restoration Council 2004). The ridges will be open and behave as shaded fuel breaks for wildfire defense. The upper third of slopes, just below the ridge will have a mix of large diameter Douglas-fir, ponderosa pines and rust-resistant sugar pines (USDA Forest Service 1995d, page 6-4). Stands on the middle third of the slope will be trending toward having multi-layered canopies and old-growth characteristics.

Stand Health

The project area will be compositionally, structurally, and functionally diverse. There will be a mix of historically dominant species. Fire-adapted, shade-intolerant species such as ponderosa pine, sugar pine, and various hardwoods are established and common in the project area (USDA Forest Service 1995d, page 6-5). The fire-frequent mixed conifer forests would include clumps, openings, and widely spaced single trees, providing spatial variability. Blister rust resistant sugar pines will be present within the project area. Mid-mature stands will be trending toward fire resilient, late-seral stands. Insect and disease infestation will be at endemic levels throughout the project area.

Meadow Function

Meadow habitat will primarily be covered with herbaceous and shrubby vegetation. Long-term productivity of existing meadow species, habitat diversity, and hydrologic utility will be maintained.

Rural Community Health

Wood products will be available to the public and will be used as biomass when the market allows (Forest Plan Standards and Guidelines, MA17-7, MA17-12, and Forest wide Standards and Guidelines 21-48, 21-49; pages 4-132 and 4-50, respectively). There will be opportunities for natural resource-based enterprises to be developed (Forest Plan, Forest wide Standards and Guidelines 27-1, 27-8; page 4-65).

1.3 Purpose and Need for Action

An interdisciplinary team composed of specialists from a wide array of disciplines in collaboration with interested parties developed a proposal consistent with all Forest Plan Standards and Guidelines. The collaboration efforts included several public meetings and field trips to discuss the need for change and potential actions in the project area (see appendix E for details on the collaborative effort). By comparing the existing conditions in the project area with the desired conditions from the Forest Plan, Sawyers Bar Community Wildfire Protection Plan, and the North Fork Salmon Watershed Assessment, the interdisciplinary team identified the following purpose and need for this project:

- Improve defensibility against wildfire to the municipal watershed and nearby communities;
- Improve compositional, structural, and functional attributes of biologically diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease infestation; and
- Provide a broad range of ecosystem services including wood products, rural economic health, biodiversity and beneficial uses of water.

The project's ecological restoration is based on the concept that the ecological function is expressed in the pattern of trees on the landscape (Larson and Churchill, 2012) which encompasses species composition, structural diversity and openings. The project's restoration has two foci. The first focus is to improve resiliency to disturbance, such as insects and disease infestation (especially dwarf mistletoe in white fir and Douglas-fir) and wildfire. The epidemic mistletoe infection rate in the project area is affecting not only the current stand but the recruitment of the next generation of trees and is impeding the development of the young stands into more open, late seral stands. The second focus is to increase species and structural diversity in the project area. Historical mapping done circa 1940 shows that areas on the ridges were dominated by pines and hardwoods. This is unusual in the Salmon River Watershed, especially on a predominately north-facing slope. The project will provide ecosystem services by producing commercial lumber, maintaining or creating jobs, and minimizing impacts to beneficial uses to water. Additional information is available in Chapter 3.

1.4 Proposed Action (as scoped)

The interdisciplinary team, in conjunction with the informal collaborative group composed of local interested parties, inventoried the project area to identify resource concerns and develop management activities (proposed activities to achieve the purpose and need) for the Jess project. The following proposed activities have been identified to move the project area from the existing condition to the desired condition and combined into a proposed action. Project design features and best management practices (BMPs) are incorporated into this proposed action. The Forest Service proposes the following treatments on about 1,950 acres within the 8,535 acre project boundary:

- Commercially harvest about 810 acres, including natural stands and plantations, with about 120 acres proposed for skyline and 690 acres of ground-based yarding;
- Treating fuels on strategic ridge tops on about 165 acres, including 95 acres of thinning, handpiling, and burning and 70 acres of mastication;
- Reducing roadside fuels on about 615 acres along more than 15 miles of National Forest Transportation System roads;
- Prescribed underburning about 250 acres;
- Planting rust-resistant sugar pine on scattered acres throughout the project area;
- Enhancing meadows around Mud Lake and other locations in the project area; and
- Masticating and handpiling/burning brush on about 150 acres for stand health.

Acres by treatment type do not account for the overlap in treatment types.

Thinning treatments are likely to take place over the first five years after decision, followed by prescribed burning and pile burning in subsequent years. A more detailed description of this proposal, including access, is below.

Commercial harvest of trees larger than nine inches diameter at breast height (dbh) will occur on more than 800 acres. Commercial treatments will vary with species preference and would be driven by topographic location, amount of disease present, and desired regeneration species. Trees with greater than 20-50% of their crown infected with mistletoe, depending on unit, will be candidates for removal. Dominant and co-dominant trees with full crowns, despite mistletoe infection will be maintained in treatment units. Several units have groups of older trees that will be retained as islands to provide spatial variation. Some small openings will be increased to resemble more historic gap sizes of one - 2½ acres. Hardwoods will be favored and will be thinned around in areas.

Enhancement of hardwoods and reduction of conifer competition is prescribed in several units. Patches of saplings and pole size trees will be avoided during treatment. Overall, the best crowns will be maintained with crown spacing varying from five to 20 feet wide. Sugar pines proven to be rust-resistant from a local seed zone and appropriate elevation bands will be planted in newly created openings within areas of historical dominance.

Small diameter (less than nine inches dbh) conifers in ridge top fuel treatments will be thinned, handpiled, and burned. Mastication will occur along strategic ridges between the handpiled areas to complete the ridge treatments.

Roadside treatments will manually cut, handpile, and burn brush and small diameter trees (less than six inches dbh) within buffers about 100 feet wide on either side of the road. Actual treatment may vary in size and width depending on fuel conditions. Trees less than ten inches dbh will be thinned to an average of 20-foot bole spacing. Existing brush densities will be reduced by 40-60% where they exist. All hazard trees will be identified and removed in accordance with danger tree guidelines. Roadside fuels treatments would complement treatments proposed by the local fire safe council.

Pre-commercial treatments will thin small diameter conifers (less than nine inches dbh) to approximately 28-30 foot bole spacing or a specified distance from trees of a certain diameter. For example, if a tree is four inches dbh, then spacing will be dbh times 12 plus ten feet, equaling 14-foot bole spacing. There will be species-specific preferences for thinning in some units.

Meadow treatments will consist of manually removing small diameter conifers (less than nine inches dbh). The removed trees will be handpiled and burned. Noxious weeds will be removed using manual techniques. Willows may be planted in and around the meadows where needed to increase shade and bank stability.

Three miles of existing roadbeds will be used as temporary roads for short-term access and then closed following project completion to reduce log skidding distances and associated impacts to soils and other resources. No new temporary roads are proposed. Existing landings will be used to the extent possible. The estimated number of new landings needed for the project is 30, with a maximum size of less than one-acre each.

1.5 Decision Framework

Given the purpose and need, the responsible official will review the proposed action, the other alternatives, and the environmental consequences to determine whether to implement the proposed action as described, to select a different action alternative, or to take no action to make changes to existing conditions in the Jess project area. Alternative 2 (modified proposed action) is considered the preferred alternative at this time.

1.6 Management Direction and Additional Guidance

The Forest Plan provides Forest-wide and Management Area direction for project-level projects. The project area is primarily within Partial Retention and Riparian Reserves, with smaller areas of Recreational River, General Forest, and Late Successional Reserve (Table 2). A summary of relevant Forest Plan goals is included in Table 2.

Table 2. Summary of Forest Plan goals by Management Area within the project area.

Management Area	Acres in project area	% of project area	Pages in Forest Plan*	Goals Pertinent to This Proposal
Late Successional Reserve (Management Area -5)	170	2	4-83	The objective of LSRs is to protect and enhance conditions of late-successional and "old growth" forest ecosystems, which serve as habitat for late-successional and "old growth"-related species including the northern spotted owl. These reserves are designed to maintain a functional,

Management Area	Acres in project area	% of project area	Pages in Forest Plan*	Goals Pertinent to This Proposal
				interacting, late-successional and “old growth” forest ecosystem.
Riparian Reserves** (Management Area -10)	2,735	32	4-106	Maintain and restore riparian-dependent structures and functions of intermittent streams. Provide benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants and provide for greater connectivity of the watershed. Provide connectivity corridors among the LSRs. Be consistent with Aquatic Conservation Strategy goals.
Recreational River (Management Area -13)	485	6	4-121	Protect and enhance the outstandingly remarkable value(s) for which the river(s) are or would be designated, while providing for public recreation and resource uses that do not adversely impact or degrade those values.
Partial Retention (Management Area -15)	4,810	56	4-126	Provide an attractive, forested landscape where management activities remain visually subordinate to the character of the landscape. Manage human activities so they are subordinate to the character of the landscape. Manage for a sustained yield of wood products in areas capable, available, and suitable for timber production. Maintain stand health as well as resilience to wildland fire, insect, disease, and other damage.
General Forest (Management Area-17)	335	4	4-131	Provide a programmed, non-declining flow of timber products, sustainable through time. These levels may vary from year to year, based on ecological processes. Maintain conifer stocking levels and high growth rates commensurate with the capability of the site to produce wood fiber. Intensively manage young regenerated stands to maximize growth potential. Maintain stand health, as well as resilience to wildland fire, insect, disease, and other damage. Emulate ecological processes and stand and landscape patterns where possible. Within harvest units, maintain appropriate structure, composition, and ecological functioning of the area.
	<p>*Page numbers are from the Forest Plan accessed online March 1, 2014. Note: There are about 200 acres of private lands within the Jess project boundary.</p> <p>**Total acres including hydrologic and unstable lands Riparian Reserves.</p>			

In addition to Forest Plan direction, the interdisciplinary team considered mid-level assessments or guidance documents, including North Fork Salmon Watershed Analysis (USDA Forest Service 1995d) and the Sawyers Bar Community Wildfire Protection Plan (Salmon River Watershed Restoration Council 2004).

The northeastern section of the project area is within the 2012 northern spotted owl Critical Habitat designation. The Revised Northern Spotted Owl Recovery Plan (USDI, Fish and Wildlife Service 2011) provides recommendations for northern spotted owl Critical Habitat improvements (page III-21), including actions that should focus on landscape-scale, science-based restoration needed to conserve northern spotted owl habitat. Further, the recovery plan calls for proposals to be designed in a manner that enables the forest to recover from past management measures and to become resilient to large-scale disturbance.

This project is authorized under the Health Forest Restoration Act of 2003 (HFRA) and complies with local and regional management plans as defined below.

- The proposed action was developed to address threats to ecosystem components due to epidemic levels of mistletoe infection in white fir and Douglas-fir stands in the project area. The project is designed to re-establish the ecosystem's ecologic integrity by using silvicultural methods to reduce the dwarf mistletoe rate of infection and stand health so the forest stands can better respond to dwarf mistletoe presence. (HFRA, Sec (102 (a)(4)).
- The project lies within National Forest System Lands and is within the Wildland Urban Interface for the community of Sawyers Bar, California. The Jess project includes the entire watershed that supplies the municipal water for the community. The Community Wildfire Protection Plan identifies Sawyers Bar as a community at risk to wildfire and the municipal watershed as at high risk to wildfire. The project addresses the threat of wildfire to the community of Sawyers Bar, California and its municipal water source (Jessups Gulch). The project is designed to reduce the risk of wildland fire by improving the defensibility of the project area by treating ridgetops, improving the safety of ingress/egress, and providing maintenance to existing control features already on the landscape. (HFRA, Sec. (102 (a)(2) and Sec. (102 (a)(3))).
- There were six public meetings focused on collaboration on the project where the Forest encouraged the exchange of information and the voicing of concerns with the project. (HFRA, Sec. (104(f))). See appendix E for details on the collaborative effort.
- The project is consistent with the Forest Plan and HFRA (Sec. 102(b)) in that the project is not located (a) within a component of the National Wilderness Preserve System, (b) on Federal land on which the removal of vegetation is prohibited or restricted by Act of Congress or Presidential proclamation, or (c) within a Wilderness Study Area (HFRA, Sec. 102 (d)).

The interdisciplinary team designed the project to be consistent with all applicable law, regulation, policy, and direction.

1.7 Public Involvement

The Forest has been working collaboratively on Jess project planning with local landowners, government agencies, and interested parties. All collaborative meetings have been held in Sawyers Bar, California. A summary of how the collaborative effort influenced the project can be found in appendix E. The first collaborative meeting was held on January 25, 2012, with a focus on introducing the project and the collaborative concept. The primary discussion during the next meeting on March 15, 2012, was on the purpose of and need for the project. A field trip was held on June 21, 2012, to review potential treatment areas and discuss the extent of the mistletoe infestation.

The project was first published to the Schedule of Proposed Actions and the Forest website on July 1, 2012.

On April 26, 2013 a scoping letter was sent to interested and affected parties, including other public agencies, tribes, adjacent property owners, and interested groups and individuals. On May 5, 2013 a legal notice of scoping was published in the Siskiyou Daily News. On May 6, 2013, a notice of intent to prepare an environmental impact statement for the Jess project was published in the Federal Register, asking that comments on the proposed action be received by June 20, 2013 and beginning the formal scoping process that guides the development of the draft environmental impact statement (DEIS). The comments received as a result of public scoping, and their disposition, are in appendix G.

The Forest Service offered a public meeting on July 27, 2013. Six participants attended the meeting in Sawyers Bar, California, including a U.S. Fish and Wildlife Service representative, local landowners, and interested parties. The meeting resulted in clarification of previously received scoping comments. The interdisciplinary team met and reviewed the scoping responses on July 16, 2013.

A public meeting was held in Sawyers Bar, California on February 5, 2014. There were six participants including a U.S. Fish and Wildlife representative, local landowners, and interested parties. The meeting focused on remaining concerns that collaborators had regarding the project. A public field trip on April 2, 2014, was attended by ten collaborators including a representative from the U.S. Fish and Wildlife Service and the interested public. The field trip focused on areas of concern identified during the February 5, 2014, meeting.

The Forest Service is actively consulting with the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration (National Marine Fisheries Service), the State Historic Preservation Office, the Karuk Tribe, and the Quartz Valley Indian Reservation.

1.8 Issues

The Forest Service received 160 comments by means of five letters during public scoping. The comments were grouped into 45 subject categories. Comments from the public and other agencies were used to formulate issues concerning the proposed action (appendix G). The Forest Service separated the issues into two groups: Relevant and Other Issues. Relevant Issues were defined as those directly or indirectly caused by implementing the proposed action. Other Issues were identified as those: 1) outside the

scope of the proposed action; 2) a procedural concern already decided by law, policy or regulation; 3) a procedural concern that is addressed through project design or analysis; or 4) conjectural and not supported by scientific or factual evidence.

The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3A discussion of the ways in which issues and concerns other than Relevant Issues were considered is presented in appendix G.

There were a total of seven relevant issues identified by the interdisciplinary team. There were five relevant issues identified during the public scoping process. Two of the relevant issues were used to develop alternative 3; these issues and indicators for comparing how alternatives address issues are displayed in Table 3. The three other relevant issues identified during scoping were alternatives suggested by commenters that were considered but eliminated from detailed study (alternatives A, B and C) for reasons detailed in Section 2.3 (

Table 4). The two additional relevant issues were raised during the collaborative process. The fourth alternative suggested but eliminated from detailed study (alternative D, Section 2.3) was developed in response to comments made during the public meeting held on February 5, 2014 (

Table 4). The fifth alternative suggested by eliminated from detailed study (alternative E, Section 2.3) was developed in response to an alternative recommendation made during the public field trip held on April 2, 2014 (

Table 4).

Table 3. Relevant issues that resulted in alternatives analyzed in detail and associated indicators.

Relevant Issue #1: There is a disagreement about the effects of logging on northern spotted owl habitat and increasing barred owl competition.

Alternative 3 responds to this issue by reducing the acres treated in northern spotted owl suitable habitat and minimizing the removal of foraging habitat.

Indicators:

- Acres of northern spotted owl habitat downgraded or removed immediately after treatment.
 - Acres of Critical Habitat downgraded or removed immediately after treatment.
 - Northern spotted owl habitat components present 30 years after implementation.
 - Increase in Barred Owl competition.
-

Relevant Issue #2: There is a disagreement about the effects of logging and fuels treatments within Riparian Reserves on canopy cover and wildlife habitat connectivity.

Alternative 3 responds to this issue by eliminating treatments in riparian reserves.

Indicators:

- Acres of riparian reserve with project activities proposed.
- Changes to shade on perennial and late-flowing intermittent streams.
- Acres of dispersal habitat (represents connectivity).

Table 4. Relevant issues that resulted in alternatives considered but eliminated from detailed study.

Relevant Issue	Responding Alternative Considered but Eliminated from Detailed Study (Section 2.3)
#3: A recommendation made during public scoping for an alternative that treated fuels along the Sawyers Bar Road.	Alternative A
#4: A recommendation made during public scoping for an alternative that retains all large mistletoe-infected trees	Alternative B
#5: A recommendation made during public scoping for an alternative that retains 60% canopy, excludes Riparian Reserves from treatment, and concentrates on plantation thinning and fuels reduction.	Alternative C
#6: A recommendation made during the public meeting on February 5, 2014 for an alternative that would use multiple entries of harvest to meet project goals.	Alternative D
#7: A recommendation made during public meeting on April 2, 2014 for an alternative that uses smoke from prescribed burning to manage dwarf mistletoe.	Alternative E

Chapter 2. Alternatives, Including the Proposed Action

2.1 Introduction

This chapter describes and compares the alternatives considered for the Jess project. Federal agencies are required to “rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reason for their having been eliminated” (Code of Federal Regulations (CFR) part 40, 1502.14). This chapter includes a description of each alternative considered in detail. It also includes alternatives considered but eliminated from detailed study and the reason for their elimination. Maps of each alternative considered in detail are available in appendix B.

This chapter also presents the alternatives considered in detail in comparative form, sharply defining the differences between alternatives and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternatives (i.e., acres treated by methods) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e. acres of habitat modified or jobs created).

The interdisciplinary team developed the proposed action (modified as alternative 2) to respond to the purpose and need of the project. The other action alternative (alternative 3) responds to public comments on the Notice of Intent. Although HFRA projects normally include only the proposed action and the no action alternative, this project analyzed one additional action alternative because it was raised by the public and meets the purpose and need for the project. Alternative 3 was developed to minimize impacts to habitat for the northern spotted owl and disturbance to Riparian Reserves that may be related to treatments.

A “no action” alternative (alternative 1), required by both NEPA and HFRA, is analyzed to provide a baseline for consideration of the effects of the proposed action and another action alternative. Four additional alternatives responding to public comment are considered but eliminated from detailed study for reasons cited below.

2.2 Alternatives Considered in Detail

2.2.1 Alternative 1

Alternative 1 is the continuation of the current level of management and use, an alternative required by both NEPA and HFRA. There will be no project-related treatment with this alternative. Alternative 1 (taking no action) provides reviewers a baseline to compare the magnitude of environmental effects of the action alternatives.

2.2.2 Alternative 2

The proposed action has had three modifications since scoping. Six acres of non-commercial thinning were added to provide for maintenance of the genetics progeny site within the project area. Six acres of mastication were changed to handpile and burn due to the inability for mastication equipment to access the unit. The roadside fuels treatments

were expanded to 200 feet on either side of the road per the Community Wildfire Protection Plan recommendation. The rest of the proposed action remains the same as presented during scoping. The prescription for non-commercial treatments, including handpiling and burning, was changed from trees less than nine inches dbh and the roadside fuels treatment changed from less than six inches dbh to less than ten inches dbh. The Interdisciplinary team determined that this change will allow for improved stand treatment, defensibility, and is more consistent with the current timber market.

A map of alternative 2 can be found in appendix B (Figure 3). The treatments proposed for the Jess project can be categorized as: 1) Ridgetop fuels treatments, 2) Roadside fuels treatments, 3) Silvicultural treatments, and 4) Meadow treatments. The ridgetop fuels treatments are handpiling/burning, mastication and underburning. Silvicultural treatments include non-commercial thinning using handpiling/burning (removing trees with less than ten inch dbh), mastication, and commercial harvest (removing trees with greater than or equal to ten inch dbh). These treatments are commonly used on the Forest to reduce stand stocking levels to desired condition, increase or maintain structural and species diversity, and increase the development of the large tree component. To achieve treatment objectives, unit-specific silvicultural prescriptions and tree marking guidelines were developed and can be found in the Silviculture Report on the project website.

Ridgetop fuels treatments

Ridgetop fuels treatments are focused on re-arranging fuels to improve the defensibility of the Jessups Gulch watershed from wildfire. Small diameter (less than ten inch dbh) conifers will be thinned, handpiled, and burned. Mastication will occur along strategic ridges between the handpiled areas to complete the ridgetop treatments.

The underburning in the Jess project is focused on ridgetops and improving defensibility of the Jessups Gulch watershed from wildfire. A 250-acre block near the ridge will be underburned. This treatment overlaps with commercial and non-commercial treatment units. Underburning will be completed when the one-hour fuel moisture is between about 7-9%, the ten-hour fuel moisture is between about 9-14% and the 100-hour fuel moisture is about 11-15%. The air temperature will be between 50-85 degrees Fahrenheit, relative humidity will be about 25-60% and the wind speeds between zero and ten miles per hour. This prescription is intended to keep mortality below 10% and less than 5% canopy loss.

Roadside fuels treatments

Fuels treatments are designed to slow and modify fire behavior and provide safe ingress and egress to the public and firefighters during a wildfire event. Brush and small diameter trees (less than ten inch dbh) adjacent to the roads will be manually cut, handpiled and burned. Actual treatment may vary in size and width depending on fuel conditions but will be 200 feet or less from either side of the road. Trees less than ten inch dbh will be variable-density thinned to an average of 20-foot spacing. Existing brush densities will be reduced by 40-60%. All hazard trees will be identified and removed in accordance with danger tree guidelines (Regional Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region (Report #RO-12-01)) (Angwin et al. 2012). Roadside fuels treatments will be implemented to complement treatments planned by the local fire safe council and the Eddy Late Successional Reserve Habitat Restoration project.

Silvicultural Treatments

Non-commercial silvicultural treatment will include removing small diameter conifers (less than ten inch dbh) to leave about a 28-foot to 30-foot bole spacing or a specified distance from trees of a certain diameter. A “D-plus” rule is applied to determine spacing. The “D” is the tree diameter in inches which is directly converted to feet (for example, a ten inch dbh becomes ten feet of spacing). The “plus” is an additional distance in feet to arrive at desired inter-tree spacing. For example: D plus 8 feet for an 8 inch dbh tree will provide 16 feet of spacing between trees; a 4 -inch dbh tree will provide 12 feet of spacing between trees. There will be species-specific preferences for thinning in some units based on topographic location, amount of disease present and desired regeneration species.

Commercial silvicultural treatments will be focused on the upper 2/3 of slopes. There are no treatments proposed in the lower 1/3 of slopes. The prescriptions take into account the elevation of the stand, the aspect, and the slope position. Species preference will again vary by unit and be driven by topographic location, amount of disease present, and desired regeneration species.

Partial harvesting of larger diameter trees dates back to the 1960s; this harvest created openings within many of the stands. These openings have regenerated and are currently stocked with seedling, sapling and pole (less than ten inch dbh) sized trees. Where these pockets and small aggregations are densely stocked, non-commercial thinning is prescribed.

Enhancement of hardwoods and reduction of conifer competition is prescribed in several units. Patches of saplings and pole-sized trees will be avoided during treatment. Overall, the best crowns will be maintained with crown spacing varying from five to twenty feet wide. Sugar pines proven to be rust-resistant that is available from a local seed zone and appropriate elevation bands will be planted in newly created openings within areas of historical dominance.

All commercial harvest units will be whole-tree yarded (the entire tree is removed) to minimize activity fuels. In addition, all commercial harvest will be evaluated to determine the need for activities to remove activity fuels, such as prescribed fire treatments which could include underburning, handpiling or jackpot burning depending on the terrain, brush type, height or fuel loading. These treatments will focus on breaking up fuel continuity and brush concentrations within three to ten years after the commercial treatments have been completed to prevent hazards to the community or the municipal watershed.

The silvicultural prescriptions for the Jess project are varied, and are intended, based on current stand conditions, to achieve the following:

- A reduction in the amount of understory (typically six inches dbh to 20” dbh) that has developed since the 1920s when local fire suppression became more successful or since partial harvest activities in the 1970-80s;
- Removal of significant numbers of conifers within stands that have a hardwood component and were historically more species diverse;

- Maintenance and restoration of the pine component that has been reduced through past management actions or disease;
- A reduction in the amount of dwarf mistletoe in all species but particularly white fir and Douglas-fir; and
- A reduction in stand density to reduce insect and disease outbreak potential, allow natural regeneration within plantations, and increase stand resiliency to unexpected wildland fire occurrence, potential changes in climate, and increasing drought conditions.

Meadow Treatments

Small diameter conifers (less than ten inches dbh) will be hand-felled, hand-piled and burned. The meadows will be treated for noxious weeds using manual techniques. Willows may be planted in and around the meadows where needed to increase shade and bank stability.

Connected Actions

The following connected actions will be analyzed as part of alternative 2. About two miles of temporary roads on existing roadbeds will be used for short-term access to the project; these will then be hydrologically stabilized following project completion. Using temporary roads will reduce log skidding distances and associated impacts to soils and other resources (project design feature watershed-22, section 2.2.4). No new temporary roads are proposed. Existing landings will be used to the extent possible. There will be approximately one landing for each commercial harvest unit that will be about one acre in size. Road maintenance will occur before, during and after commercial harvest. See project design features for requirements and limitations of the road maintenance (Table 5).

Water drafting will occur for dust abatement. There are four primary drafting sites in the project area at established locations: North Fork Salmon River access points at Gallia Mine and downstream of Jackass Creek, Jones Gulch tributary at end of Forest Road 39N21A, and Jessups Gulch tributary at Burns Ranch. However, unforeseen circumstances, such as drought or fire suppression activities, may make the exclusive use of these sites difficult. If this should happen other drafting sites in the area may be used in consultation with the fisheries biologist and/or an earth scientist. Project design features intended to minimize impacts to water quality from water drafting can be found in Table 5.

The inventory and mitigation of legacy sediment sources are required to receive a *Waiver of Waste Discharge Requirements for Non-point Source Discharge Related to Certain Federal Land Management Activities on National Forest System Lands* (Order No. R1-2010-0029) from the California Regional Water Quality Board, North Coast Region (Water Board). Most of the roads in the project area have legacy sediment sources that were addressed by the North Fork Roads Stormproofing project (see appendix C). However, five legacy sites requiring treatment are identified that are outside of the North Fork Roads decision but within the Jess project boundary (Figure 5). On Forest Service Road 39N54 and on the temporary road on an existing roadbed adjacent to Road 40N46, there is a need to install a stream crossing dip to prevent stream water from diverting down the road. On the temporary road on an existing roadbed between 39N44 and

39N65, there is a need to remove a stream crossing during the hydrologic stabilization of the road when the project is complete. Finally, the crossing near the intersection of 39N41 and 39N44 needs to be upgraded to a larger size to accommodate high flows and needs to have a stream crossing dip constructed.

Treatments in Riparian Reserves

Riparian Reserves “generally include an aquatic ecosystem system and adjacent upland areas that directly affect it” (Forest Plan, page 4-106). For purposes of this document, we call these Riparian Reserves “hydrologic” since they are defined in terms of a specific width around a body of water. Riparian Reserves “can also include unstable and potentially unstable areas that are not associated with a riparian area...” (Forest Plan, page 4-106). For the purposes of this document, we call these Riparian Reserves “geologic” since they are defined by the geology of an area.

There are 2,265 acres of hydrologic Riparian Reserves in the project area. This does not include the 470 acres of geologic Riparian Reserves; there are no treatments proposed on these acres. The hydrologic Riparian Reserve treatments in alternative 2 are unit-specific and include limitations based on the need to treat to meet Aquatic Conservation Strategy Objectives (Forest Plan, page 4-6). See appendix A for unit-specific treatments.

The treatments in hydrologic Riparian Reserves will vary depending on the condition and function of the Riparian Reserve. Equipment will be excluded within the inner 100 feet of intermittent and perennial streams. In general, the hydrologic Riparian Reserves will have no commercial treatments. An exception may be made in the outer 70 feet of the hydrologic Riparian Reserves which may be treated for fuels reduction or may be thinned when such treatments are needed to enhance the large tree components and other desired conditions of Riparian Reserves. A total of 260 acres of hydrologic Riparian Reserves exist in treatment areas; 120 acres are in commercial harvest units of which 60 acres will be treated. The hydrologic Riparian Reserve-specific treatments are summarized in appendix A. Silvicultural considerations for hydrologic Riparian Reserve treatments are incorporated into the treatment prescriptions in the Silviculture Report. No hydrologic Riparian Reserves will be entered by mastication equipment. Handpiling and underburning will occur in hydrologic Riparian Reserves with limitations. There are 120 acres of hydrologic Riparian Reserve in the roadside fuels treatment units. The watershed project design features (section 2.2.4) provide restrictions on hydrologic Riparian Reserve treatments to mitigate impacts and meet the Aquatic Conservation Strategy objectives.

2.2.3 Alternative 3

This alternative was developed in response to relevant issues 1 and 2 (section 1.8) to address the disagreements about effects of logging on northern spotted owl habitat and effects of treatments within Riparian Reserves. Treatments in alternative 3 are identical to alternative 2 with the exception of the differences described below and listed in Table 6 of section 2.5 (see Figure 4 in appendix B):

- There are about 1,505 acres proposed for treatments (compared to about 1,960 acres in alternative 2).
- Commercial treatment will occur on 210 acres.

- There will be no commercial harvest in the Riparian Reserves. Handpiling and underburning will still occur in the Riparian Reserves with restrictions provided by watershed project design features (section 2.2.4). There will be 165 acres of Riparian Reserves receiving roadside fuels treatments with project design features to mitigate impacts and meet the Aquatic Conservation Strategy objectives (Table 5).
- Roadside fuels treatment will occur on 775 acres; and strategic ridgetop treatments on about 215 acres, including 90 acres of thinning and hand-piling, 40 acres of fuel break maintenance and burning, and 85 acres of mastication.

2.2.4 Project Design Features Common to All Action Alternatives

Standard mitigation measures are applied to all projects to minimize negative environmental effects. Project design features specific to this project, developed prior to and after scoping, will be used as a part of all action alternatives to minimize or eliminate negative effects to resources in the project area. Specific best management practices (BMPs) that will be followed are listed in appendix D of this document. Interim Riparian Reserve widths from the Forest Plan are used for this project because these are determined to be sufficient for resource protection in the project area.

Design features in Table 5 are listed under the resource for which they are intended to mitigate effects. Design features are applicable to alternatives in which these units are being treated.

Table 5. Project design features.

Resource	Project Design Feature	Applicable Unit/Area and Alternatives
Air Quality-1	Native surface roadways will be watered to suppress dust and maintain fine material on road surface.	All Areas
Air Quality-2	Ignition will only take place on permissive burn days as determined by California Air Resources Board and the Siskiyou County Air Pollution Control District.	All Areas
Air Quality-3	Notices of burning will be issued to advise the public and local residence when burning may occur and areas that might be affected by smoke.	All Areas
Botany-1	The boundary of each population of <i>Cypripedium fasciculatum</i> – clustered lady's slipper and <i>Cypripedium montanum</i> – mountain lady's slipper will be flagged as buffer areas for avoidance. No heavy equipment will operate within flagged buffer areas.	105, 113, 120, 121, 122, 129, and 130
Botany-2	Within the flagged buffer areas for <i>Cypripedium fasciculatum</i> – clustered lady's slipper and <i>Cypripedium montanum</i> – mountain lady's slipper, handwork may be allowed provided that habitat characteristics will be maintained including shade (primarily provided by overstory conifers), hardwood and shrub components, and duff layer.	105, 113, 120, 121, 122, 129, and, 130

Botany-3	Within the flagged buffer areas for <i>Cypripedium fasciculatum</i> – clustered lady's slipper and <i>Cypripedium montanum</i> – mountain lady's slipper, small diameter fuels may be removed by hand and piled outside of the flagged buffer area provided that design feature Botany-2 is met. Consultation with the District Botanist is required prior to implementation of fuels treatment to determine the needs of each individual population.	105, 113, 120, 121, 122, 129, and 130
Botany-4	No project activity will occur within the flagged buffer boundary for <i>Cypripedium fasciculatum</i> – clustered lady's slipper and <i>Cypripedium montanum</i> – mountain lady's slipper.	Roadside fuels treatment on road 40N46 and 39N27, unit 70, and all under-burning activities
Botany-5	To maintain potential host species for <i>Otidea leporina</i> , retain a large component distributed throughout the stand and healthy conifer and hardwood species that exist in the stand including, sugar pine, ponderosa pine, Douglas fir, madrone, and black oak.	110
Botany-6	To protect <i>Otidea leporina</i> habitat, minimize soil compaction and soil disturbance by maximizing use of existing skid trails for project implementation.	110
Botany-7	At the end of project activities, maintain a layer of duff over 50% of the unit area to retain surface organic matter and moisture retention for <i>Otidea leporina</i> population.	110
Engineering-1	National Forest Transportation System roads will be maintained, as needed, prior to and during harvest activities. Maintenance activities include the clearing of brush and small trees within the road prism, surface blading to provide a smooth road surface, water drainage control, and dust abatement.	All National Forest Transportation System roads
Engineering-2	All temporary roads on existing road beds used for this project will be closed immediately following operations. Road closure will include any, all, or a combination of the following activities: (1) placing boulders, earth, or log mound barriers to prevent vehicle traffic; (2) sub-soiling and out-sloping the road surface; (3) installing water bars and other drainage structures; and (4) mulching with native materials (logging slash) or certified weed-free straw.	All temporary roads on existing roadbeds Temporary road B. will be blocked above the progeny site.
Engineering-3	For more effective road closures, no trees will be removed within 50 feet of the entry of any temporary roads on existing road beds used for project access, where it intersects a National Forest Transportation System road. Exceptions to this restriction include the removal of hazard trees and a few trees to provide equipment access.	All temporary roads on existing roadbeds

Engineering-4	When multiple entries are necessary for project completion, roads used by contractors will be closed in between each entry.	All temporary roads on existing roadbeds and National Forest Transportation System roads
Heritage-1	Heritage sites will be flagged and avoided by all project actions during implementation of the project.	All Areas
Heritage-2	All skid roads, road improvements, landings, and burn pile areas will be designated on a map and reviewed by the district archaeologist prior to project implementation.	All Areas
Heritage-3	If any late discoveries of human remains or heritage resources sites not previously recorded are identified during the project implementation, work within the area of potential affect will immediately stop and the district archaeologist and Heritage Program Manager will be consulted to determine how best to proceed.	All Areas
Noxious Weeds-1	If landings are needed within an infestation of <i>Isatis tinctoria</i> (Dyer's woad), consult with the district botanist to determine the best location. If a landing is placed in a location that is infested with Dyer's woad, equipment will be used to push the top layer of soil with the seed bank into a pile away from where equipment and vehicles will be operating prior to use of the landing. All Dyer's woad infestations will be flagged prior to implementation.	101, 105, 106, 107, 118, and 121
Noxious Weeds-2	Avoid parking equipment and vehicles in locations infested with <i>Isatis tinctoria</i> (Dyer's woad).	101, 105, 106, 107, 118, 121, 43, 71, and Roadside Fuels Treatments on roads 39N27, 39N41, 39N60, and 38N22
Noxious Weeds-3	No burn piles will be created directly within noxious weed infestations of <i>Isatis tinctoria</i> (Dyer's woad). Fuels may be removed by hand from within the infestation and piled outside the flagged area.	43 and 71, Roadside Fuels Treatments on roads 39N27, 39N41, 39N60, and 38N22
Noxious Weeds-4	Equipment will be cleaned of soil, seeds vegetative matter, and other debris that could contain or hold seed prior to moving to the project area, after operating within an area with a known site, and after leaving the project area.	Entire Project Area
Noxious Weeds-5	Wherever seed and/or straw is used to restore areas of ground disturbance, certified weed-free seed and straw will be required and specified in the contract.	Entire Project Area

Recreation-1	Only cut trees consistent with Region 5 Hazard Tree guidelines that are within the 100-foot buffer of dispersed sites 54D013, 54D013A, and 54D014. Establish 100-foot “no-cut buffer” around dispersed recreation sites 54D013, 54D013A, and 54D014. Hazard trees will be removed.	107 and 102
Recreation-2	Locate skid trails and landings away from and out of sight of the above dispersed areas. If skid trails or landings are required within sight of dispersed sites, remove or pile and burn all slash, debris, dirt piles and berms, and rehabilitate area.	107 and 102
Watershed-1	When working in hydrologic Riparian Reserves, if there is a 30% chance of rain in the next 24 hours the Timber Sale Administrator will be on site to insure that winterization or erosion control procedures are implemented in a timely manner and shutdown procedures are implemented. Operations will not resume until suitable weather, soil, and forecast conditions exist, as determined by the Timber Sale Administrator.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138
Watershed-2	Cable corridors will be placed on the landscape in order to minimize disturbance to inner gorges and avoid disturbance of active landslides and landslide toe zones.	Units 125, 128, 109, 110, 112, 120, 122, and 138
Watershed-3	No silvicultural treatments will occur on unstable lands and ground-based equipment will be excluded from active landslides and landslide toe zones.	128 and 122
Watershed-4	Trees directly rooted into the banks or otherwise and obviously integral to the stability of the channel bank will not be removed.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138
Watershed-5	Skidding equipment will be restricted to slopes less than 35%. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35%.	All Commercial Ground-based Harvest Units
Watershed-6	To maintain existing coarse woody debris, ground-based equipment will avoid larger diameter logs to the extent practical. Coarse woody debris consists of downed wood within a terrestrial environment.	All Commercial Ground-based Harvest Units
Watershed-7	Limit equipment disturbance within 20 feet on either side of swales by minimizing equipment crossings and avoiding running trails up the axis of swales (swales are shallow ephemeral channels that do not meet the definition of a Riparian Reserve because they lack annual channel scour).	All Commercial Ground-based Harvest Units

Watershed-8	Existing skid trails will be reused whenever possible. Designation of new skid trails will be approved by the Timber Sale Administrator.	All Commercial Ground-based Harvest Units
Watershed-9	No skid trails will cross intermittent stream, except when the stream is dry and the use and location is designated by the Timber Sale Administrator. Perennial streams will not be crossed.	103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138. The wet area in unit 102 may be crossed by the road.
Watershed-10	When the Timber Sale Administrator designates the use of skid trails across dry intermittent streams or dry swales, the crossing will be restored before any storm (with reasonable chance of causing off-site sediment movement) Restoration of crossings will be immediate following use consisting of removing excess soil, reshaping and waterbarring former approaches, and spreading slash on the former crossing.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138
Watershed-11	Slash or water bars will be applied to skyline corridors where necessary to minimize the concentration of surface runoff and where the ground cover is below 50%.	All Commercial Skyline Harvest Units
Watershed-12	Place skyline yarding corridors that are parallel to stream channels outside stream Riparian Reserves.	125, 128, 130, and 136
Watershed-13	Where ground-based yarding/endlining is used to retrieve logs from Riparian Reserve equipment exclusion zones and if gouging occurs that creates a trough for overland flow to enter the channel, waterbars will be installed or slash applied to the area.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138
Watershed-14	Construct new landings outside of both stream-course and unstable-land Riparian Reserves and away from locations where sediment is likely to enter streams (areas that have a hydrologic connection to streams).	All Commercial Ground-based and Skyline Harvest Units

Watershed-15	Existing landings will be used to the extent possible. Existing landings within 50 feet of the slope break to a stream channel or inner gorge with the exception of four landings analyzed for effects to resources (in units 108, 110, 118, 119).	All Commercial Ground-based and Skyline Harvest Units
Watershed-16	All skyline yarding stands will use one end suspension. Full suspension over stream channels is desired where possible.	All Commercial Skyline Harvest Units
Watershed-17	Once project activities are completed, hydrologically stabilize landings by re-establishing natural runoff patterns to protect water quality.	All Commercial Ground-based and Skyline Harvest Units
Watershed-18	Material will not be side casted (i.e. fill material will not be pushed downslope of landing) during the reconstruction of any landing.	All Commercial Ground-based Harvest Units and all Commercial Skyline Harvest Units
Watershed-19	At project completion, permanent operating water bars will be installed and/or repaired and slash will be scattered along all skid trails as needed.	All Commercial Ground-based Harvest Units
Watershed-20	Hazard trees that have fallen or are felled within hydrologic Riparian Reserves will generally be left on site. Fallen or felled hazard trees may be removed from hydrologic Riparian Reserves if: i. Trees must be removed to provide safe road passage or campground access and function; OR ii. Those trees would pose a substantial risk to the Forest road drainage system integrity.	All Riparian Reserves in the Project Area
Watershed-21	The project is proposed to take place during the normal operating season that is defined as April 15 to October 15 and in dry periods outside the Normal Operating Season with Line Officer approval. Actions will be restricted during periods of wet weather during the Normal Operating Season.	Entire Project Area
Watershed-22	The proposed temporary roads on existing roadbeds will be outsloped, covered with slash if needed, and blocked after the harvest season (and prior to the first winter after use) (see Engineering-2 and Engineering-3). The temporary roads will be decommissioned (hydrologically restored) at project completion. Decommissioning includes the removal of culverts and fills at stream crossings, out-sloping of road surfaces, and obliteration (re-contouring) of temporary road segments.	All Temporary Roads on Existing Roadbeds

Watershed-23	Improvements on the existing National Forest Transportation System roads to the project area will not over-steepen the road cuts, will minimize sidecasting, and will maintain the ditches and cross drains or any outslope of the roadway.	All National Forest Transportation System Roads
Watershed-24	Spot rocking will be used as needed in wet areas where damage to the roadbed may occur and adversely create rills which may move sediment into stream channels.	All National Forest Transportation System Roads
Watershed-25	Use erosion control methods on access and/or main roads that are treated for dust abatement to prevent any water leakage from causing stream sedimentation.	All Temporary Roads on Existing Roadbeds and all System Roads
Watershed-26	<p>When drafting from streams occupied by Chinook and Coho salmon: <i>National Oceanic and Atmospheric Administration (NOAA) Fisheries Water Drafting Specifications:</i></p> <ul style="list-style-type: none"> • When in habitat potentially occupied by Chinook and Coho salmon, intakes will be screened with 3/32" mesh for rounded or square openings, or 1/16" mesh for slotted openings. When in habitat potentially occupied by steelhead trout, intakes will be screened with 1/8" mesh size. Wetted surface area of the screen or fish-exclusion device shall be proportional to the pump rate to ensure that water velocity at the screen surface does not exceed 0.33 feet/second (The use of a National Oceanic and Atmospheric Administration approved fish screen will ensure the above specifications are met.) • Fish screen will be placed parallel to flow. • Pumping rate will not exceed 350 gallons-per-minute or 10% of the flow of the anadromous stream drafted from. • Pumping will be terminated when tank is full. <p>Additional applicable specifications:</p> <ul style="list-style-type: none"> • Water drafting by more than one truck shall not occur simultaneously. • Water drafting sites located within fish-bearing stream segments may not be modified, except rocking the approach to prevent sedimentation 	Drafting Sites in Chinook and Coho salmon Habitat.

Watershed-27	<p>When drafting from streams that are not occupied by Chinook or Coho salmon:</p> <ul style="list-style-type: none"> • Drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cubic feet per second. • Drafting rate should not exceed 50 percent of surface flow. • Drafting should cease from when bypass surface flow drops below ten gallons per minute. • Drafting by more than one truck shall not occur simultaneously. • Water drafting sites located in non-fish-bearing waters <u>only</u> may include minor in-stream modification, such as fine sediment removal and building of board/plastic dams • Rock and gravel drafting sites as needed to prevent stream sedimentation. 	Drafting Sites outside of Chinook and Coho Habitat.
Watershed-28	Draft water only at designated water drafting sites.	All Drafting Sites
Watershed-29	Activities which require culvert replacement or removal will occur during the least critical periods for water and aquatic resources: when streams are dry; during low-water conditions; and/or in compliance with spawning and breeding season restrictions. Low-water/dry conditions for the project area occur generally between July and October, depending upon snowpack and individual drainage characteristics. The district fish biologist or hydrologist will be consulted for appropriate timing at specific locations.	Legacy Sites
Watershed-30	<p>No fueling or servicing of vehicles used will take place within Riparian Reserves.</p> <p>No fueling/refueling of mechanical equipment will occur within 100 feet of any flowing watercourse or intermittent drainage.</p> <p>All spills will be reported and clean-up initiated in accordance with applicable State and Federal laws, rules and regulations. The Forest Hazardous Materials Coordinator's name and phone number will be available to Forest Service personnel who are administering or managing the use of petroleum-powered activities.</p> <p>NOAA Fisheries will be notified for emergency consultation in the event that a spill may affect federally listed aquatic species.</p>	Entire Project Area
Watershed-31	A spill containment kit will be available at the location of any refueling or servicing.	Entire Project Area
Watershed-32	Limit the operation of track-mounted masticators to slopes of less than 45%.	All Mastication Units
Watershed-33	Fuel treatment prescriptions will be designed to maintain post-treatment soil cover ranging between 50% and 70%, depending on slope steepness and fuel reduction treatments (see Soils Resource Report for unit details).	All Units
Watershed-34	Masticators will not operate within 100 feet of perennial and/or intermittent streams and not operated within break in slope of inner gorge. Crossings of dry intermittent channels may occur at locations designated by the Timber Sale Administrator.	42, 48, 70 and 73
Watershed-35	Hand piles will be placed in a checkerboard pattern whenever possible (not one pile directly above another). Hand piles will be six feet or less in diameter.	All Units

Watershed-36	Use of mastication equipment will follow Forest Wet Weather Operations Standards.	Entire Project Area
Watershed-37	Burn piles will not be placed within 30 feet of perennial stream channels greater than one foot wetted width, or within 15 feet of intermittent stream or perennials less than one foot wetted width.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 125, 128, 129, 138 and underburn.
Watershed-38	When underburning is prescribed, avoid the construction of handlines within Riparian Reserves closer than 25 feet to a watercourse and/or within riparian vegetation as possible.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 125, 128, 129, 138 and underburn
Watershed-39	Handlines will be mitigated (waterbarred and covered with organic material) immediately following prescribed burning and under safe conditions.	All Units
Watershed-40	When underburning within Riparian Reserves, maintain at least 90% of the large woody debris (both standing and on the ground) as unburned or not consumed.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 125, 128, 129, 138 and underburn
Watershed-41	Within Riparian Reserves, prescribed fire effects will mimic a low intensity backing fire and ignition will usually not occur there. Hand piles may have higher fire intensity in order to consume pile material.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 125, 128, 129, 138 and underburn
Wildlife –1	Marking crews will coordinate with a wildlife biologist to ensure “skip” areas are clearly marked as to not receive commercial treatment.	102, 104, 107, 108, 110, 111, 112, 118, 119, 120, 121, 122, 125, and 128

Wildlife-2	Noise producing treatments that are above ambient noise levels within 0.25 miles of an occupied northern spotted owl (NSO) activity center or within 0.25 mile of un-surveyed nesting/roosting habitat will have a seasonal restriction of February 1st to July 9th. This limited operating period may be lifted if protocol surveys as described in PDF Wildlife 3 determine NSOs are not nesting on year of action	46, 47, 48, 103 (a and c), 104 (a and b), 105, 110, 111 (a and c), 114, 115 (b and c), 116, 117, 118, 120, 121(b and d), 122, 125, 128, and portions of 39N21, 39N27, 39N60, and 40N46
Wildlife-3	Surveys will follow regionally approved protocol or as agreed upon by local Level One Team.	All Units
Wildlife-4	When burning in spring, smoke is managed so that light to moderate dispersed smoke may be present within a canyon or drainage but dissipates or lifts within 24 hours. When spring (February 1 to July 9) burning is conducted within 0.25 mile and uphill of a known NSO activity center or 0.25 miles of un-surveyed nesting/roosting habitat, smoke is managed as described above, and ignition should be discontinued if heavy, concentrated smoke begins to inundate suitable habitat late in the afternoon.	46, 47, 48, 103 (a and c), 104 (a and b), 105, 110, 111 (a and c), 114, 115 (b and c), 116, 117, 118, 120, 121(b and d), 122, 125, 128, and portions of 39N21, 39N27, 39N60, and 40N46
Wildlife-5	Mark and avoid treatment in a portion of units identified to be consistent with Recovery Actions.	Unit 116 (approx. 1 acre on the inside edge of KL1034 core) and roadside unit 40N46 (end of unit on the both sides of the edge of KL0233 core. Approx. 2 acre).
Wildlife-6	No known bald eagle nest trees, perch trees, or roost trees will be removed or destroyed as a result of prescribed fire or fuels reduction treatments.	Project Area

Wildlife-7	To minimize smoke effects on bald eagles, prescribed burning will not be implemented within 0.5 mile of a known or suspected nest territory from January 1st to August 31st, or a known or suspected winter roost area from November 1st to March 31st. If survey demonstrates that nest sites are not active, no seasonal restrictions are required.	Project Area
Wildlife-8	Actions that create noise above ambient levels within 0.25 miles of active or suspected bald eagle nests, or be implemented within 0.5 mile line- of -sight of such nests, will be seasonally restricted from January 1st to August 31st. If surveys demonstrate that bald eagles nest sites are not active, no seasonal restriction required.	Project Area
Wildlife-9	Actions that create noise above ambient levels within of an active or suspected bald eagle roost will be seasonally restricted from November 1st to March 31st. If surveys demonstrate that roosts are not active, no seasonal restrictions are required.	Project Area
Wildlife-10	If an occupied northern goshawk nest sites is located, no burning or use of heavy equipment will be implemented within 0.25 miles of the nest site between March 1st and August 31st. If protocol surveys are conducted and the site is found to be unoccupied, proposed actions may proceed.	Project Area
Wildlife-11	Retain an average of five to 20 of the largest available logs on the ground in treatment units.	All Commercial Harvest Units
Wildlife-12	Where present, retain the largest hardwood snags. These provide valuable habitat components for many species, including fisher and marten.	All Commercial Harvest Units
Wildlife-13	Where possible retain pre- existing large snags greater than 14- inches dbh distributed across the project landscape.	All Commercial Harvest Units
Wildlife-14	Retain at a minimum two to five snags on an average per acre where available. This is to be assessed on a landscape level. Snag retention may not be met equally on every acre but will be met at a landscape scale. Retain snags in clump or groups, situated around the largest and live trees where possible. Select snags with broken tops as first priority.	All Commercial Harvest Units
Wildlife - 15	Use protection buffers of known Survey and Manage species sites to minimize impacts to these species.	105, 112, 125, 140, 147, 40N46, 39N44, 39N27, and 39N21

2.3 Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm.

Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Alternative A: An alternative was suggested during public scoping that included fuels reduction along the Sawyers Bar Road from the Forest Boundary to Sawyers Bar (Relevant issue #3 (section 1.8 and appendix G)). The activity suggested is outside of the project boundary. Since this suggested alternative is outside of the scope of the project, it is eliminated from detailed study.

Alternative B: An alternative was suggested during public scoping to retain all of the large mistletoe-infected trees in the project area (Relevant issue #4 (section 1.8 and appendix G)). One aspect of the purpose and need for this project is to restore ecological processes that build resiliency to high intensity disturbance. The project area has epidemic levels of mistletoe infection which has led to decreased vigor and increased mortality in the Douglas-fir and white fir; this decreased vigor and increased mortality interrupts the ecological function of the project area. Mistletoe spreads by dropping its seeds from a higher tree into adjacent and lower trees. Therefore, leaving the larger and taller infected trees will not interrupt this uncharacteristically high infection rate and will be counter to the purpose and need of the project. Therefore, the alternative is eliminated from detailed study for this reason.

Alternative C: An alternative was suggested during public scoping that retains 60% canopy cover in all stands, excludes riparian reserves from treatment, concentrates on thinning small diameter trees in plantations, and uses fuels treatments to protect old-growth and northern spotted owl habitat. This is in response to relevant issue #5 (section 1.8 and appendix G). Alternative 3 analyzes the exclusion of riparian reserves from treatments. The purpose and need of the project is to restore ecological processes that build resiliency to high intensity disturbance caused by wildfire and insect and disease infestation. The project area has epidemic levels of mistletoe infection which has led to decreased vigor and increased mortality in the Douglas-fir and white fir; decreased vigor and increased mortality interrupts the ecological function of the project area. Mistletoe spreads by dropping its seeds from a higher tree into adjacent and lower trees. As noted in the discussion of alternative B, retaining canopy cover of 60% and only removing small trees in plantations will not allow for the removal of the larger and taller infected trees. Retaining canopy cover of 60% will keep the Douglas-fir stands relatively dense, allowing the unnaturally high infection rates to continue, and therefore, will not meet the purpose and need of the project. Although there may be indirect protection to communities from strategic fuels treatments specifically targeted to protect old-growth and northern spotted owl habitat, this alternative will not fully meet the purpose and need of this project. Since alternative C meets only a portion of the purpose and need of this project, it was eliminated from detailed study.

Alternative D: An alternative was suggested during the collaborative public meeting on February 5, 2014, that uses multiple entries of small volume harvest, about five to ten years apart, to mitigate impacts such as increased brush response and a decrease in tree canopy from commercial thinning. However, research indicates that the partial removal of forest overstory that is heavily infected by dwarf mistletoe can increase mistletoe seed production and infection rates in the newly recruited trees (Knutson and Tinnin, 1980). Since the increase in mistletoe rates and negative effects on newly recruited trees that will

result from this alternative are counter to the project's purpose and need, and a multiple-entry approach will not meet the Regional Forester's direction to design projects so they meet stand density objectives for at least 20 years after implementation (USDA Forest Service 2004), this alternative is eliminated from detailed study.

Alternative E: An alternative was suggested during the collaborative field trip on April 2, 2014, that uses smoke from prescribed fire to control the mistletoe infection rate in the project area. Exposure to smoke has been shown to inhibit dwarf mistletoe specific to ponderosa pine, limber pine and lodge pole pine seed germination (Zimmerman and Laven, 1987). The inhibition of seed germination is dependent on the moisture of the fuels and the time exposed to smoke. Smoke will only impact the germination of seeds, not the dwarf mistletoe itself. To be effective, smoke exposure will have to occur every year for decades during the seed germination period under the correct fuel moisture regimes. The probability of permissible burn days overlapping with these conditions every year for decades is improbable. This alternative is infeasible, and is eliminated from detailed study.

2.4 Monitoring

As thinning of larger trees (of a size to be sold commercially, usually greater than ten inches in dbh) and of smaller trees (also known as non-commercial) is implemented, projects are monitored by Forest Service personnel as part of normal operating procedures. Forest Service employees monitor timber marking of harvest units to ensure that prescriptions and marking guides are being followed. Forest Service sale administrators monitor the harvest to assure that Forest Plan standards and guidelines, best management practices, and project design features are being implemented. Forest Service personnel monitor non-commercial thinning as it being accomplished to determine if objectives are being achieved and make sure thinning specifications are being followed.

As fuels treatments are implemented, projects are monitored as part of normal operating procedures. Prior to prescribed burning, burn plans are developed. Burn plans for prescribed fire require monitoring of the burning to ensure that project objectives are being achieved.

The application of project design features that are identified for wildlife species are monitored in implementation and effectiveness monitoring. Assumptions made pertaining to effects to species are validated. The U.S. Fish and Wildlife Service will continue involvement through project implementation by meeting with the Forest representatives, designated marking crews and contractors before and during project activities within 0.5 miles of northern spotted owl core areas to ensure that agreed-upon marking guidelines and protection measures are implemented. Post-project surveys for northern spotted owl will be conducted to evaluate pair occupancy and barred owl presence.

Post-project monitoring for the spread of non-native invasive species (noxious weeds) will occur as part of Forest Plan monitoring. Results will be documented in the Forest annual monitoring reports.

Best Management Practices Evaluation Program monitoring will occur on a sample of the BMPs appropriate for this project which are listed in appendix D. Since many project

activities do not occur within the same year, they will be included in Best Management Practices Evaluation Program monitoring pools for up to a decade as needed. The Forest Sediment Monitoring Plan (USDA Forest Service 2013c) and Shade Monitoring Plan (USDA Forest Service 2011) will be implemented for Total Maximum Daily Load compliance as displayed in the North Coast Region Basin Plan (California State Water Quality Control Board, 2011).

Monitoring to assess the implementation and effectiveness of project design features to meet soil Standard and Guidelines in the Forest Plan may occur in the Jess project. Field investigations of soil cover, soil compaction, and impacts to soil organic matter will occur on a minimum of 5% of activity areas forest wide, as described in Chapter 5 of the Forest Plan. Units will be selected randomly from all activity areas across the Forest where soil disturbing activities take place; the Jess project will be included in the sampling pool for soil monitoring. Results will be documented in the Forest annual monitoring reports.

2.5 Comparison of Alternatives

This section provides a summary of the treatments in each alternative and a comparison of the effects of implementing each alternative. Table 6 displays a comparison of the acres of fuel and silvicultural treatments in each alternative considered in detail.

Table 6. Comparison of thinning and fuels treatments by alternatives in acres treated.

		Alternative 1 (acres)	Alternative 2 (acres)	Alternative 3 (acres)
Total Treatment Footprint (includes overlapping treatments)		0	1,960	1,505
Total Treatment Acres (if treatments laid out side by side)		0	2,000	1,535
Ridgetop Fuels Treatments	Handpile	0	85	90
	Mastication	0	70	85
	Fuel Break	0	30	40
	Underburning	0	250	250
	Total Treatment Area	0	435	465
Commercial Silvicultural Treatment	Ground-based	0	690	180
	Skyline	0	120	30
	Total Treatment Area	0	810	210
Non- commercial Silvicultural Treatments	Mastication	0	60	45
	Non-commercial treatment with handpiling and burning	0	70	65
	Total Treatment Area	0	130	110
Roadside Fuels Treatment		0	615	740
Meadow Treatment		0	10	10

Table 7 displays a comparison of alternatives on how each meets the purpose and need components for the project. The project is managing fuel loading along ridges and on

existing fuel breaks/control points so that the community of Sawyers Bar and its municipal watershed are defensible against wildfire.

Table 7. Summary of alternative effects related to purpose and need of the project.

Purpose and Need				
	Measurement Indicator	Alternative 1	Alternative 2	Alternative 3
Improve defensibility against wildfire to municipal watershed and nearby communities.				
Reduced risk to community and municipal watershed	Acres of limited fuel continuity and reduced fuel loads	0	1,960	1,535
Safety of Ingress/Egress	Acres of fuels treatments	0	615	740
	Miles of road with fuels treatments	0	15	15
Improved defensibility against wildfire	Acres of fuel breaks/control points maintained (includes underburned block, hand piling and mastication)	0	435	465
Improve compositional, structural, and functional attributes of biologically diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease.				
Resilience to Disturbance	Acres with Stand Density Index of less than 55% after 30 years	0	810	210
Dwarf Mistletoe Infection	Change in % of trees per acre infected with dwarf mistletoe after 30 years	Douglas-fir +285%	Douglas-fir -54%	Douglas-fir +103%
		White fir +1,800%	White fir -73%	White fir +764%
Species Composition	Acres with a change in species composition toward desired condition	0	810	210
Structural Diversity	Areas with an increase in opening frequency and size	0	810	210
Fuel Loading	Tons per acre of fuel loading after 30 years	44	31	40
Provide a broad range of ecosystem services, including wood products, rural economic health, biodiversity, and the beneficial uses of water.				
Economic Health	Number of jobs created	0	73	17
Wood Products	Volume of lumber (in hundreds of cubic feet)	0	13,325	3,800
Biodiversity	Acres treated	0	1,960	1,505
Beneficial Uses of Water	Municipal watershed protected	No	Yes	Yes

Table 8 displays a comparison of how each alternative addresses the relevant issues identified during public scoping.

Table 8. Comparison of alternative indicators related to relevant issues.

Relevant Issue				
Response Consideration	Measurement Indicator	Alternative 1	Alternative 2	Alternative 3
There is a disagreement about the effects of logging on northern spotted owl habitat and increasing barred owl competition.				
Effects to northern spotted owl habitat	Acres Downgraded or Removed: Nesting/Roosting Foraging	0 0	0 535	0 15
Effect to Critical Habitat for northern spotted owl	Acres Downgraded or Removed: Nesting/Roosting Foraging	0 0	0 44	0 0
Northern spotted owl habitat components present	Estimated Average Percent Canopy Cover	60%	40%	50%
	Trees greater than 26 inches dbh per acre	17.9	11.9	15.8
Barred Owl Impacts	Change in barred owl competition	none	none	none
There is a disagreement about the effects of logging and fuels treatments in Riparian Reserves on canopy cover and wildlife habitat connectivity.				
Disturbance in Riparian Reserves	Acres of Commercial Harvest in Riparian Reserves	0	60	0
Shade	Change in Canopy Cover on late-flowing intermittent and perennial streams.	None	None	None
Connectivity	Acres of Dispersal Habitat removed	0	30	27
Connectivity	Total acres of dispersal in the project area	3063	3033	3036

Information in Table 9 is focused on environmental effects on resources where different levels of effects of outputs can be distinguished qualitatively or quantitatively among alternatives. For all resources in all action alternatives, negative effects are minimized or eliminated by application of project design features. This table displays the potential environmental effects of alternatives themselves, not the cumulative effects of the alternatives plus current and reasonably foreseeable actions. Cumulative effects are disclosed in Chapter 3 in the disclosure of the environmental effects on each resource.

Table 9. Comparison of effects of alternatives by resource.

Resource	Alternative 1	Alternative 2	Alternative 3
Vegetation	No changes from current management activities; the levels of dwarf mistletoe will increase by 285% for Douglas-fir and 1800% for white fir by 2042. The average Stand Density Index will be about 420 by 2042.	The levels of dwarf mistletoe will be reduced by 54% for Douglas-fir and 73% for white fir by 2042. Resiliency to disturbance, stand diversity and structural complexity will be improved on 810 acres. The average Stand Density Index will be about 271 by 2042.	The levels of dwarf mistletoe will be increased by 103% for Douglas-fir and 764% for white fire by 2042. Resiliency to disturbance, stand diversity and structural complexity will be improved on 210 acres. The average Stand Density Index will be about 365 by 2042.
Fuels	No changes from current management activities; there will be no improvement to the defensibility to the municipal watershed or the community of Sawyers Bar; there will be 0 acres or miles of improved control features. Fuel loading will be 44 tons per acre in 2042.	The defensibility will be improved for the municipal watershed and the community of Sawyers Bar. There will 435 acres of improved control features and 15 miles of roads receiving roadside fuels treatments. Fuel loading will be 31 tons per acre in 2042.	The defensibility will be improved for the municipal watershed and the community of Sawyers Bar. There will 465 acres of improved control features and 15 miles of roads receiving roadside fuels treatments. Fuel loading will be 40 tons per acre in 2042.
Wildlife	No changes from current management activities; there will be a reduction in stand resiliency, species diversity and structural complexity in the project area over the long-term (greater than 20 years).	There will be 535 acres of northern spotted owl foraging habitat removed or downgraded; there will be 810 acres of long-term stand improvements (increased resiliency to disturbance, species diversity and stand complexity).	There will be zero acres of northern spotted owl foraging habitat removed/downgraded; there will be 210 acres of long-term stand improvements (increased resiliency to disturbance, species diversity and stand complexity).
Fish	No changes from current management activities; there will be no effect to fish habitat.	Sediment producing activities will be at least 2 miles away from fish habitat. The alternative is not likely to adversely affect fish.	Same as alternative 2.
Botany	No changes from current management activities; there are no Threatened or Endangered plants in the project area. There will be no effect to Sensitive plant species in the project area.	The alternative may affect individual (Sensitive plants) but is not likely to in a trend towards Federal listing.	Same as alternative 2.

Resource	Alternative 1	Alternative 2	Alternative 3
Non-Native Invasive Species	No changes from current management activities; there is a low risk of weed introduction and spread.	The risk of weed introduction and spread will remain low with implementation of project design features.	Same as alternative 2.
Geology	No changes from current management activities; there is a moderate landslide risk in Eddy Gulch and a high landslide risk in Olsen Creek, Shiltos Creek and Jessups Gulch.	The cumulative watershed effects model (GEO) will increase in Jessups Gulch by 8%; the landslide risk will not increase.	The cumulative watershed effects model (GEO) will increase in Jessups Gulch by 2%; the landslide risk will not increase.
Air Quality	No changes from current management activities; there will be no criteria pollutants or greenhouse gases emitted.	There will be about 19 tons/year of nitrogen oxides emitted; this is in compliance with the Conformity Rule and the Clean Air Act; and 20,300 metric tons of greenhouse gas emissions.	There will be about 15 tons/year of nitrogen oxides emitted; this is in compliance with the Conformity Rule and the Clean Air Act; and 15,900 metric tons of greenhouse gas emissions.
Soils	No changes from current management activities; 88% of the analysis area has undisturbed soils.	The estimated percent of the treatment area not meeting desired conditions for soil stability, soil organic matter, and soil structure is 2.3%, 4.4%, and 2.1%, respectively.	The estimated percent of the treatment area not meeting desired conditions for soil stability, soil organic matter, and soil structure is 1.1%, 2.1%, and 1.0%, respectively.
Water Quality	No changes from current management activities; decrease in stand health will impact Riparian Reserve function. Shade will be decreased in the long term due to tree mortality.	There will be 60 acres of Riparian Reserve commercially treated. Shade and stream temperature will not be reduced in the short term; treatments will increase shade in the long term.	There will be no Riparian Reserves commercially treated. Shade and stream temperature will not be reduced in the short term; shade will decrease due to tree mortality in the long term.
Society and Culture	No changes from current management activities. Safety for community residents, firefighters, forest workers and visitors will continue to be a concern in the event of wildfire.	Positive effects of creation of 73 jobs with no unequal distribution among racial and ethnic groups or older residents; no effect to civil rights or environmental justice. Safety will be improved by roadside and ridgetop treatments.	Positive effects of creation of 17 jobs with no unequal distribution among racial and ethnic groups or older residents; no effect to civil rights or environmental justice. Safety will be improved by roadside and ridgetop treatments.
Economics	No changes from current management activities; no jobs will be created and there will be no costs or benefits from management activities.	73 jobs created; about \$1.5 million of timber to market.	17 jobs created; about \$500,000 of timber to market.

Resource	Alternative 1	Alternative 2	Alternative 3
Scenery and Recreation	No changes from current management activities; there will be no scenic disturbances in the short term but may be negative impacts from tree mortality in the long term.	The scenic character will not be impacted and visual quality objectives will be met. The scenic integrity of the Salmon River as a Wild and Scenic River will be maintained.	Same as alternative 2.
Cultural Resources	No changes from current management activities; no negative effects expected.	Potential effects to cultural resources from activities on 1,960 acres. No actual negative effects will occur.	Potential effects to cultural resources from activities on 1,505 acres. No actual negative effects will occur.

Chapter 3 Affected Environment and Environmental Consequences

This chapter summarizes the physical, biological, social and economic environments that may be affected by the proposed action and alternatives on the environment (affected environment) and the effects on that environment that will result from implementation of alternatives (environmental consequences). It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

Analysis methods are discussed for each resource, followed by a description of the affected environment. The affected environment section describes the existing, or baseline, condition against which environmental effects are evaluated and from which progress toward the desired condition can be measured (represented by the “no action” alternative). The environmental consequences section discusses the potential effects to the resource associated with the implementation of each alternative. This forms the scientific and analytic basis for comparison of the alternatives, including the proposed action. This section discloses direct, indirect, and cumulative effects on the resource and discusses the potential for significance of these effects. Effects are quantified where possible; qualitative discussions are included where appropriate. The proposed action and action alternatives include the project design features which were developed to minimize negative effects. Therefore, the effects of the proposed action and action alternatives are analyzed based on design features being in place.

Effects are defined as (1) direct effects that are caused by an action and occur at the same place and time as the action; (2) indirect effects that are caused by an action but are later in time, or removed in distance, from the action; and (3) cumulative effects that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Direct and indirect effects of an action are often discussed together. Cumulative effects are discussed separately. They can result from individually minor, but collectively significant, actions taking place over a period of time. Past, present, and reasonably foreseeable future actions are assessed along with the effects of the proposed action and alternatives to determine whether significant cumulative effects may occur.

The Whites fire of 2014 may have cumulative effects on the Jess project since the fire itself and containment lines are within the 5th and 7th field watersheds being analyzed in this project. However, since the Whites fire has not yet been controlled, it is premature to analyze its effects. These will be analyzed between the DEIS and FEIS; if they produce significant cumulative effects, a supplemental DEIS will be prepared.

This analysis is consistent with the CEQ memorandum (CEQ, 2005) which is incorporated by reference and states: “...agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.” Past actions are treated similarly in the recently published Forest Service direction for implementing NEPA (Forest Service Handbook (FSH) 1909.15, 15.1). For these reasons, the analysis of past actions in this draft environmental impact statement is based on current environmental conditions (affected environment).

The cumulative effects analysis in this draft environmental impact statement is also consistent with Forest Service NEPA Regulations (36 CFR 220.4(f)) that state, in part:

CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonably foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision-making (40 CFR 1508.7).

Analysis areas for determining environmental effects vary by resource, as do the other actions included in each cumulative effects analysis. Cumulative effects in an analysis area may include estimated effects from past, present, and reasonably foreseeable future private or public vegetation treatments, road construction, grazing, and wildfire suppression or lack of same. A list of such potential actions is included in appendix C of this document.

Separate resource reports provide background for the analysis summarized in this draft environmental impact statement. These reports use resource data housed in the geographic information system (GIS) and other relevant sources. The reports are summarized in this chapter and incorporated by reference; they are available on the project website.

3.1 Vegetation

3.1.1 Analysis Indicators and Methodology

Field data were collected from proposed harvest units during the fall of 2011 and summer of 2012 by a two person inventory crew. A silviculturist completed stand diagnosis and developed site-specific prescriptions. Stand dynamics are modeled using the Forest Vegetation Simulator. The modeled results from Forest Vegetation Simulator are not intended to be absolute values; rather they display relative trends in stand development after a prescribed treatment or no treatment. The model is run for the general treatment across a stand. While the outputs are developed from actual stand data, they represent averages of the stand and do not necessarily display the within-stand variability. The methodology is described in detail in the Silviculture Report, incorporated by reference and available on the project website.

Analysis Indicators

- Stand structure is represented by (1) the average size of trees, and (2) the number or percentage of “large” trees in a stand. To illustrate the change in stand structure with or without treatment, the analysis of the average size of trees uses Quadratic Mean Diameter, the diameter of the tree of average basal area in the stand. Stand structure measured by the number or percentage of “large” trees in a stand addresses concerns raised by the public regarding retention of “large” trees. Although there are various tree diameters discussed in literature relative to what defines a large tree, this project uses 26 inches dbh as recommended by the U.S. Fish and Wildlife Service (USDI 2009, page 49). Stand structure also includes the number of snags and coarse wood component of a stand; both of these are related to tree mortality.
- Stand Density is measured by the Stand Density Index which is a relative measure of stocking levels. Stand density affects stand health and the ability of trees to respond to disturbance. Although Stand Density Index is species-specific, it can be generally categorized for each stand as low density (0-24% of Stand Density Index maximum), moderate density (25-34% of Stand Density Index maximum), high density (35-55% of Stand Density Index maximum) or extremely high density (greater than 55% of Stand Density Index maximum). Once a stand reaches high density tree diameter growth declines. Extremely high density stands have high mortality of trees induced by active competition with other trees. Mortality related to density will have the greatest effect on the intermediate and suppressed trees. Trees heavily infected with mistletoe will prematurely die.
- Forest health is primarily represented by maintaining an endemic level of disease. This is measured by amount of dwarf mistletoe infection, quantified as number of trees infected with mistletoe per acre, as modeled. Although dwarf mistletoe is an endemic disease which is always present to some degree in conifer forests, an epidemic level of dwarf mistletoe indicates that the forest health is compromised and there is a reduction in resiliency to disturbance. Dwarf mistletoe is a host-specific parasitic seed plant. Evidence of mistletoe infection is found in the major conifer species that are present in the project area (Douglas-fir, white fir, incense cedar, ponderosa pine, sugar pine, and red fir) which is an indicator that several different dwarf mistletoe species are present at epidemic rates (see Table 1 in Section 1.2 and USDA Forest Service 2013). Dwarf mistletoe is completely dependent on its host for support, including all water and nutrients. The pathological results of dwarf mistletoe infection are seen as reductions in reproduction, growth, and longevity in host trees. The nature and magnitude of these effects are determined by the mistletoe and host species involved, infestation severity and vigor of the host (Geils and Hawksworth, 2002). Forest health is also measured by the amount of dead vegetation in a stand. Stands with larger amounts of dead vegetation are less resilient to disturbances including wildfires as well as insects and disease. Fuel loading trends through time are a metric of stand health. Tree mortality can increase ground fuel loading which can decrease the resilience of the stand to wildfire.

- Species Composition is measured by the different species (or types) of trees that exist in an area. Historically, much of the project area was pine-dominated, both by ponderosa and sugar pine, with sugar pine being the dominant species. Some stands were also historically Douglas-fir dominated. White fir now occupies the majority position primarily due to past partial-cutting practices and exclusion of natural wildfires. The effects of project alternatives are measured by the maintenance or change in species composition in the treatment area (whether or how much the alternative moves the treatment area toward a historic range of species composition).

3.1.2 Spatial and Temporal Context

Spatial bounding for direct and indirect effects will be limited to the treatment units within the project area because stand structure and density, species composition and forest health defined as an endemic level of disease will be evident primarily in treatment areas. Harvest prescriptions and subsequent analysis are applied specifically to the stands designated as units. The analysis is completed at the timber unit scale and averaged for the treatment area. While trees can be affected by conditions that occur at the landscape level, for example, an insect epidemic, they are most significantly impacted by what occurs within tens of feet from their current location. The cumulative effects analysis area for forest health includes the project area and adjacent areas for which treatments may affect the treatment units. Short-term temporal bounding includes effects within ten years. Long-term temporal bounding for effects extends out to 30 years following inventory conditions (2012). Treatments are projected in the years 2014 and 2015 with post-treatment analysis ending in the year 2042.

3.1.3 Affected Environment

All stands proposed for treatment have been harvested at least once to three times dating from ten to more than 50 years ago. Fire suppression beginning in the 1920s in the Salmon River drainage has allowed the development of second and third stories of vegetation within historically more open stands. Partial harvest encouraged regeneration of openings and development of understory trees to produce uneven-aged conditions. Past regeneration harvest units were planted to ponderosa and Jeffrey pine that are now eight to 20 inches in diameter at breast height; smaller inclusions of naturally regenerated white fir, incense-cedar and Douglas-fir also populate these units. The current high stand density of these pine stands has resulted in mortality from pine beetles. The Jess project area overlaps some of the prescribed underburning units from the 2000 Glassups Timber Sale. This underburning has caused mortality pockets in Jess project Units 112 and 117 and a clean, “park-like” understory in most of Unit 112.

Vegetation varies due to widely varying composition and condition of soils. There are old slump deposits with deep, productive soils in some units, and less developed, more skeletal soils in units that are dominated by live oak and huckleberry oak. There are talus, rocky slopes and some boulder fields. A dry meadow bordered by well stocked 100 year-old Douglas-fir exists in Unit 121. Unit 115 has an inclusion of fire-adapted Brewer oak on a rocky ridge. There is a wet meadow within Unit 107.

Stand density, species composition, and stand structure (tree sizes, species and ages) are all highly variable within each unit, with the exception of the planted pine stands. In

terms of stand structure, the average of the current quadratic mean diameter of the units being proposed for commercial harvest is 11.7 inches. In terms of stand density, basal areas range from zero square feet to more than 400 square feet per acre with stand density indices of greater than 55% of Stand Density Index, which affects the ability of trees to respond to disturbance. Forest health is compromised by epidemic levels of disease due to dwarf mistletoe infestation. Fuel loadings in treatment areas are currently low, due to recent management activities including the Glassups Timber Sale and underburn. Currently, there is an average of 12 dwarf mistletoe-infected trees per acre in the project stands proposed for treatment. Openings created by skid trails, harvest of large old trees and mortality from insects or disease result in variable tree densities and crown closures which largely influence stand structure and average tree size. In terms of species composition, hardwoods range from large live oak with scattered conifers to patches of black oak, madrone and chinquapin that are overtopped by conifers including Douglas-fir, white fir, red fir, incense-cedar, ponderosa pine, and sugar pine.

3.1.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

In alternative 1, no direct effects to vegetation will occur but there are numerous indirect effects. Long-term, effects to stand structure will include an increase in the diameter of trees; by 2042, the average quadratic mean diameter will be 19.1 inches. This change in diameter is primarily from the mortality of small diameter trees due to competition and to infestation of insects and diseases, not to the growth of trees in the stands. This alternative has the highest number of trees per acre greater than 26 inch dbh compared to the other alternatives in 2022 because these trees will not be directly removed. However, the modeling shows a fivefold increase in trees greater than 26" dbh that are likely to die over the next thirty years if left untreated. So over the long-term, there will be fewer trees greater than 26 inch dbh in the project area if left untreated.

Stand density, and density-related mortality in all size classes will continue with most of the stands having a Stand Density Index greater than 55% of maximum. Increased competition for sunlight, nutrients and water leads to reduced tree growth, increased susceptibility to insects and disease and eventually to mortality. Density-induced mortality will continue unabated for the next 30 years.

In terms of forest health, disease levels of dwarf mistletoe will continue to increase and will add to the density-related mortality that is occurring. In just seven years, trees per acre infected by mistletoe will increase from 12 to 17.9 if this alternative is implemented. Increasing disease levels also reduce growth rates of infected trees and will diminish the number of trees that will reach larger diameters before they die. Large trees will die and the smaller, younger trees will not grow to become large because of the heavy dwarf mistletoe infection. Small-tree mortality will increase the amount of dead vegetation. In terms of species composition, the prevalence of historically dominant species, ponderosa and sugar pine, will continue to decline for two reasons. First, there will be fewer pine seed trees remaining to contribute to reforesting those species. Second, white fir (a shade-tolerant tree) will repopulate the continually-occurring small openings resulting from tree mortality as has been happening for several decades. Hardwood presence will also

continue to decline as conifers continue to overtop them and eventually shade them out of the stands.

Without treatment, there will likely be an increase in fuel loading from increased mortality of mid to late-seral trees and an increase in the snag component, particularly of larger diameter trees infected with mistletoe and blister rust. Infected understory trees will also succumb to their diseases, and likely at an accelerated rate if drought conditions and overstocking persist. Hardwoods in tree form will be less prevalent on the landscape as they are shaded out by conifers, and conifer species diversity will be reduced as the more shade-tolerant white fir will continue to dominate stands. Canopy structure will be lacking in many stands and the next generation of mid-seral trees will be at a disadvantage for achieving size and contributing to future canopy structure. Overall, forest health will continue to diminish and stand conditions will be receptive to stand replacing wildfire, especially as drought conditions persist and the ability for stands to be resilient are compromised.

Cumulative Effects

Cumulative effects of alternative 1 include the indirect effects mentioned above combined with the effects of other projects in the area. The Glassups Timber Sale underburn overlaps the spatial bounds of the Jess project and the Eddy Late Successional Reserve Habitat Restoration project is adjacent to numerous treatment units. The combined effects of alternative 1 and the underburning accomplished in the Glassups Timber Sale will not substantially affect stand health of the Jess project area. Similarly, adding the effects of the Eddy project activities to the effects of no treatments in the Jess project and treatment area will not substantially affect forest health in the Jess area. Taking no action within the Jess project, when combined with the effects of the treatments in the Eddy Late Successional Reserve Habitat Restoration project, will not produce substantial cumulative effects on forest health in the Jess treatment or project area.

Alternative 2

Direct and Indirect Effects

The proposed treatment in this alternative results in accelerating average quadratic mean diameter growth across the stands by 10% over the 30-year projection period resulting in maintenance of a large tree component on the landscape. Although removal of trees across all diameters is prescribed, the trees retained in most stands are able to take advantage of the reduced competition and match or exceed the predicted growth in alternative 1 without the excess accumulation of fuel loading associated with natural mortality. In less than ten years after treatment, the modeling indicates there will be an equal number of trees with greater than 26" dbh compared to current condition. The reduction in disease throughout treatment units is also substantiated as the modeling shows a fivefold increase in trees with greater than 26" dbh that are likely to die over the next 30 years if left untreated.

Stand density, measured by Stand Density Index, is decreased by an average of 35% across all stands. One third of the stands will remain below density-induced mortality

levels for the next 30 years and the remaining stands will be below those levels for at least 20 years prior to additional treatments being needed.

There will be a reduction in mistletoe infection in all treated stands. Overall, an average of 54% reduction in Douglas-fir infections and 73% reduction in white fir infections are predicted at the end of the 30-year period. This reduction improves the quality of forest health by promoting survival and longevity of understory species and restoring endemic levels of mistletoe infestation in the treatment area.

Reducing stand densities and removal of diseased and dying trees will reduce the levels of mortality and limit future recruitment of snags and downed logs. However, the strategic location of treatment units provides many acres of untreated stands on the landscape that will continue to provide these essential ecosystem components. With a reduction in stand density, there is less competition for resources, resulting in increased growth and vigor of the trees that remain. Removal of severely mistletoe-infected trees in the overstory will reduce the spread of infection to uninfected trees. Removal of trees from these stands also results in a 30% reduction in future dead vegetation.

Species composition is affected by prescribing retention of historically-dominant species and by planting openings with rust-resistant sugar pine, where appropriate. In Units 105, 108, 109, 110, 111, 112 and 113, mapped as historically sugar pine dominant (Wieslander 1935, digitized according to Thorne et al. 2008) modeling shows increases in the pine component following treatment. Qualitative interpretation of the prescriptions, in conjunction with the trends indicated in the model, shows that the species composition will shift towards historic range of variability over time, restoring more fire-resilient and drought-tolerant species. Douglas-fir is also mapped as a historically dominant species in stands that are currently dominated by white fir or planted with pine. With the exception of units where Douglas-fir is heavily infested with dwarf mistletoe, proposed treatments modeled in Forest Vegetation Simulator show increased prevalence of Douglas-fir at the end of the 30-year period. In several stands and across the landscape, the hardwood component is diminishing; this is true primarily for hardwoods greater than eight inches dbh. Prescriptions in several stands will retain hardwoods that will persist over time and restore the function of these limited hardwood ecosystems.

It is reasonable to expect that within 30 years of treatment, stand composition would have a variety of ages and diameter classes of healthy, vigorous, relatively disease-free trees. There would be widely spaced, fire-resistant pines and other large diameter trees with interspersed gaps present on the landscape. Additionally, the hardwood component would be enhanced through the reduction of competition from overstory conifers. Canopy cover and canopy openings would be representative of historic conditions on the upper third of slopes. Mid canopy and understory trees will consist of vigorous, mistletoe-free conifers and include a variety of species including incense cedar, Douglas-fir, sugar pine, ponderosa pine and white fir. Overstory species will be diverse with some mistletoe present, but overall in vigorous form. Spacing between trees throughout stands will be varied and include clusters of vigorous, large diameter trees, patches of dense stands, and areas of widely spaced trees to represent the mosaic-like historic condition across the landscape. Smaller diameter understory trees will be thinned at a spacing to optimize their ability to grow into mid-canopy level trees.

Cumulative Effects

The direct and indirect effects when combined with the effects of the Glassups Timber Sale underburn and Eddy Gulch LSR Habitat Restoration project will create a landscape with increased vegetative health and vigor. Treatment units are placed such that over time, and immediately following treatment, dead vegetation will be reduced and unintentional wildfire spread will be minimized. Restoration will be initiated by setting stands on a trajectory to increase growth, retain species diversity, and increase resilience to natural and human-caused disturbances such as insects and disease.

Alternative 3

Direct and Indirect Effects

Alternative 3 results in accelerating average quadratic mean diameter of trees within treatment units by 2.7% by the end of the 30-year modeling period. This represents a small gain in maintenance of a large tree component in isolated patches across the landscape. Average stand density is reduced by 11.9%, allowing trees greater capacity to respond to disturbance agents. The number of trees with greater than 26 inches dbh in 2022 will be between the number in alternative 1 and alternative 2. The stands that will be treated in alternative 3 will have an equal number of trees with greater than 26 inches dbh. In the stands that are left untreated, the trees with greater than 26 inches dbh are more likely to die than in the stands that are treated.

Much of the landscape will continue to have elevated levels of mistletoe infection which will continue to diminish tree vigor and growth. Overall, stand averages under alternative 3 show a 103% increase in mistletoe in Douglas-fir and a 764% increase in mistletoe in white fir with related increased tree mortality. Accumulated dead vegetation will be decreased by 10% over 30 years. Species composition will be affected minimally since most units that are focused on restoring historically-dominant species will not be treated under alternative 3. Hardwoods will continue to be overtopped by conifer species and sugar pine will not be restored to historic levels of prevalence.

Cumulative Effects

The direct and indirect effects when combined with the effects of the Glassups Timber Sale underburn and Eddy Late Successional Reserve Habitat Restoration project will create a landscape with somewhat increased vegetative health and vigor. Treatment units are placed such that, immediately following treatment and over time, a minor amount of dead vegetation will be reduced and unintentional wildfire spread will be minimized. The integrity of the strategic placement of units will be reduced by limiting vegetative treatments to the roadside strips. Restoration will be minimally achieved. Eleven stands would be set on a trajectory to increase growth, retain species diversity, and increase resilience to natural and human-caused disturbances such as insects and disease. The remaining untreated stands will continue to incur mortality due to stand density and dwarf mistletoe infection will not be reduced.

Effects on vegetation from each of the alternatives 30-years after treatment are shown in Table 10.

Table 10. Summary of effects on vegetation analysis indicators by alternative after 30 years.

Analysis Indicator	Unit of measure	Alternative 1	Alternative 2	Alternative 3
Stand Structure after 30 years	Average % increase in Quadratic Mean Diameter	0%	10%	2.7%
	Average # of trees per acre >26 inch dbh	17.9	11.9	15.8
Stand Density after 30 years	Average Stand Density Index	420.3	271.5	356.9
Forest Health after 30 years	% increase or decrease of trees per acre infected with dwarf mistletoe	Douglas-fir +285%	Douglas-fir -54%	Douglas-fir +103%
		White fir +1,800%	White fir -73%	White fir +764%
Species Composition after 30 years	Acres treated to encourage historic tree species composition	0	810	225

3.1.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Action alternatives comply with law, policy, regulation and the Forest Plan in regard to effects to vegetation. Prescriptions (in appendix B of the Vegetation (Silviculture) Resource Report) comply with the Forest Plan and the National Forest Management Act as described in the Vegetation Management forest-wide and management area goals, standards and guidelines. Alternative 1 does not fully meet management goals to maintain stand health or resilience to insect and disease as well as the action alternatives in the long term. Alternative 2 will lead to meeting management goals for stand health on treated acres. Alternative 3 will meet goals on a smaller number of acres than alternative 2. See the Forest Plan Consistency Checklist for additional information on compliance with the Forest Plan.

3.2 Fuels and Fire

3.2.1 Analysis Indicators and Methodology

The focus of this analysis is on the ability to defend the project area against wildfire and protect the nearby community and the municipal watershed. Defensibility against wildfire was measured using two components. The first is fire behavior which is broken into two measures: (1) flame length; and (2) rate of spread of the fire. Fire behavior was modeled using the BehavePlus fire model. The output is a measure of fire behavior (fuel model) that represents an average flame length and rate of spread of a wildfire given stand conditions. The combination of flame length and rate of spread can be used to define a fire behavior as being very low, low, moderate, high and very high, as shown in Table 11. Any fire behavior above moderate has a decreased defensibility because wildfires cannot be attacked safely using direct methods completed by hand crews.

Table 11. Qualitative assessment of fire behavior based on rate of spread and flame length.

Fire Behavior	Rate of Spread (chains/hour)	Flame Length (feet)
Very Low	0-2	0-1
Low	2-5	1-4
Moderate	5-20	4-8
High	20-50	8-12
Very High	50-150	12-25
Extreme	>150	>25

The second indicator is fire risk (the probability of a wildfire occurring in the project area); this is based on historic fire records and measured by fire return intervals. Fire risk is influenced by the amount of fuel (usually dead or dying vegetation) in the project area. Tree mortality and the associated fuel loading are discussed in the Section 3.1.1.

3.2.2 Spatial and Temporal Context

The analysis area is the project area plus adjacent 7th field watersheds to encompass the potential for wildfires to come from outside the project area boundary. The short term effects are three to five years because effects of treatments are visible in that time frame. Long term effects are from five to 20 years.

3.2.3 Affected Environment

The community of Sawyers Bar, California is a community at risk to wildfire as discussed in the Sawyers Bar Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004). Access to routes for people leaving the area if wildfire occurs (egress) and for firefighters entering the area (ingress) is listed as a risk due to the high fuel loading along the escape routes (Salmon River Watershed Restoration Council, 2004, pg. 9). Jessups Gulch (the municipal watershed) is designated as being at risk from wildfire by the Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004, pg. 9) and is considered a high value resource (Salmon River Watershed Restoration Council, 2004, pg. 11).

Approximately 1,570 acres have burned within the project boundary during the period for which records have been kept (since 1925); no wildfire has occurred since 1987. Forty-three fire starts have occurred since 1925 and 15 fires have started in a 30 year span (1976-2006). Approximately one fire start has occurred per two years on average. Forty percent of the fire starts have been human-caused. The mean historic fire return interval within the project boundary has ranged from approximately ten years to 55 years, depending on biophysical setting. As depicted in Table 12, approximately 99% of the landscape supported vegetation at or below a 30-year fire return interval.

Table 12. Acres of project area in fire return intervals.

Historic Fire Return Interval	Acres
Less than 16 years	3,452
16 to 30 years	4,282
More than 30 years	75

About 75% of the project area would support flame lengths of less than four feet. This includes approximately 43% of the units (units with trees greater than ten inches in

diameter at breast height that are identified as potentially commercial harvest units) are modeled as having flame lengths less than four feet and a low rate of fire spread (less than five chains per hour). Fire behavior is characterized as low in these areas. Thirty seven percent of similar units are modeled as having flame lengths at about five feet, a rate of spread about eight chains per hour, and moderate fire behavior. A majority of the remaining similar units are modeled as having slightly longer flame lengths and rates of fire spread but also moderate fire behavior. Fuel loading is within desired conditions throughout most of the project area.

There are several natural and manmade fuel breaks along the ridges of the Jessups Gulch watershed. Many of the manmade features were built during the 1987 wildfire season. These features are in various stages of maintenance. The fuel break identified as Unit 140 in the alternatives has had recent maintenance and is currently in fully-functioning condition. Other areas have had some ladder fuel accumulation and are in need of treatment to be used efficiently during a wildfire.

3.2.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under alternative 1, no management activities are planned. As noted in section 3.1.4, fuels will continue to accumulate due to mortality resulting from insect infestation and disease attacks. In the long-term, increased fuel loading will create a condition that will increase fire behavior in the event of an ignition; this decreases the probability of rapid suppression of a wildfire and increases the risk to the community of Sawyers Bar and the municipal watershed. By 2022, 37% of the modeled units will exhibit flame lengths less than four feet and a rate of fire spread less than five chains per hour (low fire behavior). By 2032, only 14% of the modeled units will exhibit these characteristics. The modeled units move toward moderate fire behavior with this alternative. Tree mortality due to stand health issues such as epidemic dwarf mistletoe rates, high stand density, and drought will increase snags and fuel loading. This decreases the defensibility of the project area due to the increased overhead hazard and fire behavior over the next 30 years.

Surface and ladder fuels will continue to accumulate and hazard trees will remain on ridgetops; this will increase flame lengths and rate of spread of wildfire along the ridges of Jessups Gulch. Access into and out of the project area will continue to be at risk because of high fuel loading along the routes. The flame lengths and rates of spread will increase on the existing fuel break (Unit 140) which has sparse ladder fuels and light fuel loading if this shaded fuel break is not maintained for more than five years. Features such as ladder fuels and concentrations of brush on other fuel breaks will continue to accumulate hazardous fuels; the fuel breaks will become less effective at modifying fire behavior.

Cumulative Effects

The Salmon Salvage project, Eddy Late Successional Reserve project, and underburning in the Glassups project are within or in adjacent watersheds. Therefore, the effects of these projects are added to the effects of alternative 1 to disclose cumulative effects. The

Salmon Salvage project will have little effect on fire behavior and adding the effects of that project to the effects of alternative 1 in Jess will not have any cumulative effect on the fuels behavior in the Jess project. The Eddy Gulch LSR Habitat Restoration project, adjacent to the Jess project area, is designed to reduce fuels on more than 25,000 acres. This will reduce the fire hazard in the affected analysis area surrounding Jess and will reduce the risk of wildfire moving through the Eddy Gulch LSR Habitat Restoration project area and into the Jess project area. However, adding the effects of Eddy to the effects of taking no action on Jess (alternative 1) will result in no additional beneficial effects to the Jess project area. Adding the effects of Glassups Timber Sale underburning to the effects of alternative 1 will have a minor effect on reducing fire behavior in Jess project area.

Alternative 2

Direct and Indirect Effects

Alternative 2 will have some effects over time (30 years) in reducing fire behavior. The modeling of units shows a trend toward increased brush between harvest and 2022. Some of this modeled brush will in fact be small seedlings regenerating in the openings created by treatment. The fire behavior for conifer seedlings is not the same as for dormant brush. These regenerated conifer stands often have higher live fuel moistures than brush fields and will have lower flame lengths and rates of spread making it more likely to experience low/moderate fire behavior and easier to fight safely and effectively than brush patches. The patchy distribution of brush that does respond is unlikely to accelerate or change fire behavior in the project area. However, if the brush response does become continuous and modify fire behavior, treatments will be implemented to mitigate the risk (see Section 2.2.2). Flame lengths are expected to be less than four feet and elevated rates of spread will be limited to these patches.

Fuels treatments (acres on which prescribed fire is introduced and acres of other treatments that reduce fuels) will provide control lines, anchor points and safety zones for fire fighters. Ridgetop and roadside fuels treatments will rearrange surface and ladder fuels; this rearrangement is intended to slow the rate of fire spread and decrease flame lengths. The ridgetop and roadside fuels treatments will improve the effectiveness and safety of fighting wildfires. The removal of trees likely to prematurely succumb to the stresses of dwarf mistletoe infection, stand density and drought will mitigate snag creation making direct attack of a wildfire safer and more likely. There will also be a 30% reduction in ground fuel accumulation thereby maintaining the desired fuels condition for a longer period of time.

The fire behavior will be low for the 380 acres of the modeled units. The remaining 430 acres of modeled units are likely to experience moderate fire behavior overall; ladder and crown fuels will be reduced through thinning of the stands. The reduction of surface fuels will reduce the potential flame lengths within the proposed treatment areas. Combined with the raising of the canopy base heights by reducing ladder fuels, this will reduce the ability of fire to transition into a crown fire. As a result, anticipated flame lengths and rates of spread in treated units will be reduced.

Cumulative Effects

The Salmon Salvage project, Eddy Gulch Late Successional Reserve Habitat Restoration project and Glassups underburning are within the Jess project area or in an adjacent watershed. Therefore, the effects of these projects are added to the effects of alternative 2 to disclose cumulative effects. The Salmon Salvage project will have little effect on reducing fuel hazards and adding the effects of that project to the effects of alternative 2 in Jess will have only a minor cumulative effect on the fire behavior in the Jess project area. The Eddy Gulch LSR Habitat Restoration project, adjacent to the Jess project area, is designed to reduce fuels on more than 25,000 acres. This will reduce the fire behavior and increase defensibility in the affected analysis area surrounding Jess and will reduce the risk of wildfire moving through the Eddy Gulch Late Successional Reserve Habitat Restoration project area and into the Jess project area. Adding the effects of Eddy Gulch Late Successional Reserve Habitat Restoration project to the effects of alternative 2 will result in an increase in defensibility for the community of Sawyers Bar and the municipal watershed. Adding the effects of Glassups Timber Sale underburning to the effects of alternative 2 will reduce fire behavior in the Jess project area and contribute to the project having a low fire behavior and the infrastructure needed for direct attack of wildfires by hand crews. The cumulative effects of alternative 2 and other projects will reduce flame lengths, rates of spread, and increase defensibility against wildfire.

Alternative 3

Direct and Indirect Effects

The effects of alternative 3 are similar to those of alternative 2. The main difference is due to the reduction in commercial treatments and the increase in fuels treatments. The interpretation of the modeling is that if no treatment occurs in a commercial harvest unit planned in alternative 2, in alternative 3 it will have the same effects as alternative 1. The reduction in commercial treatments means there are fewer acres with increased brush by 2022. However, by 2032 the area has a higher percent of the treatment area with high fire behavior and 12% of the treatment area is trending toward increased brush. In brush-related fuels, fires carry throughout the shrub layer where foliage is more flammable but this requires moderate winds, greater than eight miles per hour at mid-flame height. Fire will drop to the ground at low wind speeds or at openings in stands. A broad range of shrub conditions is covered in brush-related fuels. Fuel situations that will be considered include intermediate stands of oak brush and snow brush. There will be more areas with increased snag densities compared to alternative 2 but decreased compared to alternative 1. Fuel loading will be reduced by 10% compared to that in alternative 1.

The fire behavior (Table 11) will be low for about 230 acres of the commercial units with low fire behavior. The remaining 580 acres of commercial units (includes units treated in alternative 2 but not alternative 3) are likely to experience moderate fire behavior. The ridgetop and roadside fuels treatments will greatly improve the effectiveness and safety of fighting wildfires directly.

Cumulative Effects

The cumulative effects of adding the effects of current and reasonably foreseeable future projects to the effects of alternative 3 are similar to those of alternative 2. The

infrastructure for direct firefighting that contributes to defensibility will be the same as in alternative 2. However, there will be few acres treated for stand health so the fire behavior will be moderate over more area (versus low) and future fuel loading is expected to be higher; this will reduce the cumulative benefits to from surrounding and adjacent treatments in the Eddy Late Successional Reserve Habitat Restoration project and the Glassups Timber Sale underburn to the project area.

3.2.5 Compliance with Law, Policy, Regulation, and the Forest Plan

The treatments of all action alternatives meet the Forest Plan as displayed in the Forest Plan Consistency Checklist on the project website.

The proposed fuels treatments in action alternatives were designed in part to meet the Comprehensive Strategy incorporated in the Forest Service Manual; this strategy also provides management direction for this project to which action alternatives comply.

3.3 Terrestrial Wildlife

3.3.1 Analysis Indicators and Methodology

For all terrestrial federally-listed, Forest Service sensitive, Survey and Manage, and Management Indicator Species (MIS), analysis indicators include the effects to habitat quantified by acres affected, or to individuals if known. Species may be federally-listed as endangered, threatened, or proposed for listing; effects to these species are disclosed in this section of the draft environmental impact statement and in the Terrestrial Wildlife Biological Assessment. Analysis indicators for federally-listed species will be acres of nesting/roosting, foraging, and dispersal habitat maintained or improved, degraded, downgraded, and removed because the only federally-listed species in the project area is the northern spotted owl. Effects to critical habitat for the owl will also be indicated as acres of habitat affected. Forest Service Sensitive Species are identified as such by the Pacific Southwest Regional Forester; effects to these species are disclosed in this section of the draft environmental impact statement and in the Wildlife Biological Evaluation. Analysis indicators for Sensitive Species will be acres of habitat maintained or improved, degraded and removed or lost. A display of habitat conditions for federally-listed and Sensitive Species in the project area is provided in Table 13. Management Indicator Species are identified in the Forest Plan; effects to these species are disclosed in this section of the draft environmental impact statement and as part of the Management Indicator Species Report, Parts I and II. Analysis indicators for Management Indicator Species will be acres of habitat maintained or improved and acres lost. For Survey and Manage species, analysis indicators will be acres of habitat maintained or improved, and acres disturbed. Information on all of these species, plus migratory birds and Survey and Manage species, and methodology used for this analysis are detailed in the Survey and Manage Compliance Review. All of these reports are incorporated by reference and are available on the project website.

3.3.2 Spatial and Temporal Context

The analysis area for effects on wildlife varies by species and reflects the area within which the species could be directly and indirectly affected by the proposed action and alternatives. For species with larger home ranges such as northern spotted owl, goshawk, or fisher, the analysis area consists of the project area plus a distance representing a

median home range in the California Klamath Province. For other species, the analysis area consists of the area of potential treatment. Temporal bounding for effects extends out to 30 years following inventory which was completed in 2012 (thus the 30-year period ends in 2042).

For the northern spotted owl, the project area is defined by the area that contains all the proposed action within the Whites Gulch and Olsen Creek 6th field watershed. The analysis area was established by a 1.3 mile buffer around treatment units plus all NSO home ranges that intersects the treatment unit buffers. The treatment area or treatment unit is the area in which the action will occur.

3.3.3 Affected Environment

Part (12,727 acres) of Subunit KW-8 (Klamath West Modeling Region) of the northern spotted owl Critical Habitat Unit 9 is located in the Jess analysis area (USDI Fish and Wildlife Service 2011). The analysis area for northern spotted owl contains approximately 2,366 acres of older forest (nesting/roosting habitat), 9,953 acres of mid-seral forest (foraging habitat), 3,010 acres of open mid-seral forest (dispersal habitat), and 5,937 acres of early seral forest (non-habitat). Hardwoods are a dominant feature in the understory of all seral stages but hardwood-dependent habitat is minimal due to hardwoods being suppressed by a lack of sunlight. The highest quality suitable habitat for northern spotted owl is mostly on the lower 2/3 of the slopes; little foraging and nesting/roosting habitat exists on the upper 1/3 of slopes.

Most the project areas contain a mix of size classes, large logs and snags, and possess conifer and hardwood diversity but, in general, units identified for potential commercial thinning are very dense and heavily stocked with early or mid-successional trees; these stand conditions can affect current and future suitable habitat quality for northern spotted owls. Four northern spotted owl home ranges exist within the analysis area.

Four northern goshawk territories, and approximately 12,282 acres of suitable habitat, overlap the analysis area as defined by northern spotted owl analysis area. High quality habitat is primarily limited to the lower slope positions. Two of the four territories are greater than one mile from the nearest proposed activities and will likely not be affected. One Goshawk Management Area (defined by the Forest Plan) is within the Jess project area, but nesting activity has not been recorded in the management area since the late 1990s. The fourth territory has not been recorded as active since 1991, but both territories within the project area will be surveyed prior to implementation.

The analysis area for Pacific fisher includes about 12,282 acres of denning/resting habitat (using information about northern spotted owl habitat as an estimate of suitable fisher habitat).

For the American marten, about 1,492 acres of potential habitat occurs in the analysis area. For other Sensitive Species, such as the pallid bat, Townsend's big-eared bat, western bumble bee and fringed myotis, suitable habitat is available but no known locations occur (no sightings of individuals have been reported).

The following table provides information on the species in the analysis area, their status, and general habitat description.

Table 13. Federally-listed, Forest Service Sensitive, and Survey and Manage Species in or adjacent to the project area based on known occurrences.

Species	Status	Known to Occur in Analysis Area?	General Habitat Description
Northern spotted owl	Federally-listed as Threatened	Four 1.3-mile radius northern spotted owl home ranges overlap project area of which three 0.5-mile radius nest cores are in the project area. 2012 designated Critical Habitat is within project area.	Nests in complex forested habitats with multi-layered canopies, large overstory trees, snags, and downed wood.
Bald eagle	Forest Service Sensitive	No known nest sites, but have been observed roosting and foraging along the North Fork Salmon River.	Nests in conifer forests containing old-growth components typically within one mile of water.
Pacific fisher	Forest Service Sensitive	No known locations (den sites) but suitable habitat is present.	Same habitat as for northern spotted owl. [plus requires multiple rest sites that are often tree cavities, squirrel/raptor nests, mistletoe platforms or brush piles]
California wolverine	Forest Service Sensitive	No known locations (den sites) but suitable habitat is present.	Use meadows, forests, riparian habitats and montane chaparral; mature, structurally complex high elevation conifer and mixed conifer-hardwood forests.
Northern goshawk	Forest Service Sensitive	One Goshawk Management Area occurs within the project area; four territories within the analysis area.	Nests in dense, mature and late successional conifer forests.
American marten	Forest Service Sensitive	No known locations but suitable habitat is found above 4,500 feet in elevation.	High-elevation true fir stands; use large logs, snags and live trees for denning/resting.
Fringed myotis	Forest Service Sensitive	No known locations, but potential habitat is available in analysis area.	Utilizes a variety of arid or wooded habitats often in association with caves; will use caves, large trees, mines, buildings and bridges for roosting.
Western bumble bee	Forest Service Sensitive	No known locations but suitable habitat is present.	The species is associated with meadows and openings in forested areas. Habitat includes flowering plants for foraging and rodent burrows for nesting.
Townsend's big-eared bat	Forest Service Sensitive	No known locations but suitable habitat is present.	Uses a variety of arid and wooded habitats often in association with caves; will use caves, large trees, mines, buildings and bridges for roosting.
Pallid bat	Forest Service Sensitive	No known locations but suitable habitat is present.	Uses a variety of arid and wooded habitats often in association with caves; will use caves, large trees,

Species	Status	Known to Occur in Analysis Area?	General Habitat Description
			mines, buildings and bridges for roosting.
Northwest pond turtle	Forest Service Sensitive	No known locations but suitable habitat is present. Treatments are not proposed within suitable habitat.	Aquatic habitats of ponds, lakes, streams; require emergent basking sites; use adjacent terrestrial habitat for overwintering and nesting.
Willow flycatcher	Forest Service Sensitive	No known locations but suitable habitat is present. Treatments are not proposed within suitable habitat.	Nests in river valleys or lush meadows in willows or other riparian tree/shrub species.
Foothill yellow-legged frog	Forest Service Sensitive	No known locations but suitable habitat is present. Treatments are not proposed within suitable habitat.	Associated with rocky streams and are rarely found far from permanent water
Cascade frog	Forest Service Sensitive	No known locations but suitable habitat is present. Treatments are not proposed within suitable habitat.	Associated with montane aquatic habitats including lakes, small streams, and ponds.
Del Norte Salamander	Survey and Manage	Known locations in project area. Protection buffers for known sites will be used.	Associated with older forest with high amount of canopy closure with cool, moist microclimate and rocky cobble size substrate
Hooded Lacetooth	Survey and Manage	Known locations in project area. Protection buffers for known sites will be used.	Associated with moist forested sites in either upland or riparian habitat with perennial subsurface dampness
Klamath shoulderband	Survey and Manage	No known locations but suitable habitat is present.	Associated with deciduous tree species in mixed hardwood/conifer stands and rock refugia
Yellow-based sideband	Survey and Manage	Known locations in project area. Protection buffers for known sites will be used.	Found in late-successional conifer forests with high canopy closure with woody debris and talus
Tehamana chapparral	Survey and Manage	No known locations but suitable habitat is present.	Associated with deciduous leaf litter near limestone caves, talus, or outcrops within mature forest habitat

3.3.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Alternative 1 will result in no changes and, therefore, no direct effects to individual wildlife species or wildlife habitats (Threatened, Endangered, and Sensitive Species, Survey and Manage Species, Management Indicator Species, and migratory birds) are anticipated. The indirect effects expected will be those effects related to the continued increase of tree mortality and disease. Tree disease levels will continue to increase and add to the mortality that is occurring. Increasing disease levels also reduce growth rates

and reduce the number of trees that will reach a larger diameter. Habitat conditions would remain as described in the existing condition with a trend toward less healthy stand conditions through 2042 (see Vegetation section of this chapter). Overall, effects to wildlife and wildlife habitats of no action will result in reduced availability and distribution of stands that could develop into suitable habitat for late successional habitat-related species (northern spotted owl and all Survey and Manage species). There will be reduced availability and development of hardwood-related wildlife species habitat in the understory as hardwoods are outcompeted by the continuing encroaching conifers. The encroachment of small diameter white fir on the small openings in the untreated stands will result in a decreased quality of wildlife habitat (dense small diameter understory with few openings for stand diversity).

Cumulative Effects

Cumulative effects to wildlife habitat are related to effects of vegetation which is analyzed in Section 3.1. The project area would benefit indirectly from the fuels reduction and stand health benefits from the Eddy Late Successional Reserve Habitat Restoration project and the Glassups Timber Sale underburning. However, these projects will not aid in reducing the overall trend of epidemic dwarf mistletoe rates in the project area and associated impacts to stand health. There is no expected degradation, downgrading, or removal of suitable habitat as a result of the Salmon Salvage project.

Alternative 2

Direct and Indirect Effects

Effects to threatened and endangered species (northern spotted owl) and critical habitat

Alternative 2 will maintain and not degrade, downgrade, or remove suitable nesting/roosting northern spotted owl habitat. All acres of nesting/roosting habitat will be maintained; no acres of nesting/roosting habitat will be degraded, downgraded, or removed within 0.5-mile northern spotted owl core areas. Proposed treatments will not remove or downgrade northern spotted owl habitat within 1.3-mile home ranges that are deficient in habitat.

The analysis area contains about 2,366 acres of nesting/roosting, 9,916 acres of foraging, and 3,063 acres of dispersal habitat. No nesting/roosting habitat will be treated and will remain in its current habitat quality. Treatments will degrade about 532 acres of foraging habitat, but the habitat will retain its current function. About 535 acres (254 acres downgraded and 281 acres removed) of foraging habitat will no longer function as its current habitat type after treatment, but 254 acres of these acres will retain the stand characteristics and function of dispersal habitat. The 535 acres of foraging habitat removed or downgraded represents about 5% of the foraging habitat that occurs in the analysis area. About 3,063 acres of dispersal habitat occurs in the analysis area. Treatments will degrade about 115 acres of dispersal habitat, but this habitat will retain its function. About 30 acres of dispersal habitat will be removed (changed to non-habitat) after treatment. Foraging and dispersal habitat that will be removed or degraded exists on the upper 1/3 of slopes where spotted owl use is uncommon.

Foraging and dispersal habitat will remain well distributed throughout the landscape. Negative effects are likely to be greatest during the short-term while the younger and

healthier trees grow and fill in the canopy. In the long-term, some of the removed habitat from treatment may increase in quality to dispersal habitat, but the habitat will likely still lack moderate level of canopy cover. However, the treatment will benefit northern spotted owl habitat by creating an environment with less disease and allow for healthier and more resilient to disturbance. These treated stands of trees will increase in stand diversity and complexity and eventually development of multi-aged stands.

The Jess project area contains about 4,409 acres of spotted owl critical habitat and about 266 acres is proposed for treatment. About 145 acres of commercial thinning are proposed and 44 acres will no longer provide suitable forage habitat after treatment. However, these treatments will only represent less than 2% of the available foraging habitat in critical habitat in the project area. The commercial treatments reduce foraging habitat, but the treatments will also aid in improving defensibility of the project area from wildfire. This will indirectly protect the remaining suitable habitat on the lower two-thirds of the slope from wildfire impacts.

Alternative 2 will result in a net increase of 426 acres of dispersal habitat. Commercial harvest on the upper 1/3 of the slope will reduce foraging habitat, but foraging and nesting/roosting habitat remain on the lower 2/3 of the slopes. This will provide suitable habitat available for use by northern spotted owls therefore the project is not expected to negatively impact barred owl/northern spotted owl interactions.

Many studies have found negative correlations between NSOs and barred owls where they co-occur. However, there is limited data to explain how land management will affect these interactions, but management recommendations focus on maintaining and increasing large patches of contiguous nesting/roosting habitat. The Jess project will not degrade, downgrade, or remove nesting/roosting habitat. Therefore, the proposed activities will not reduce the current number of nesting/roosting habitat acres and there is no strong evidence that indicated changes to NSO habitat will result in increasing barred owl and spotted interactions.

Effects on prey species for northern spotted owl will occur in the short-term by providing more understory structure. As the young trees fill in the gaps between the older trees, the stand structure will likely favor woodrats which is an important food source for spotted owls. In the long-term, as the tree canopy fills in and becomes more connected, flying tree squirrels will likely increase in numbers as the woodrats will likely decline. Secondary prey species such as deer mice and red-backed voles will likely occur in high numbers particularly with woody debris. The treatments will affect the prey number and composition in the short-term, but the changes will still provide sufficient food for a spotted owl in foraging habitat that was treated. Spotted owls may benefit from increased number of woodrats as a result of the treatment especially along the transition area between the resulting non-habitat and foraging habitat.

Treatment areas will retain snags and coarse woody debris in stream-course riparian leave areas; large snags will be retained as long as snags do not pose a safety hazard, but if felled, snags will be left in the treatment unit as woody debris. Other large snags will be retained with live trees in areas called "skip areas."

Effects on Forest Service Sensitive, Survey and Manage, Management Indicator Species, and Migratory Birds

Due to the proposed action of alternative 2 either not occurring in known species range or not affecting any habitat, there are no expected direct, indirect, or cumulative effects on the following species: bald eagle, great gray owl, foothill yellow-legged frog, Cascade frog, and Tehama chaparral snail.

Suitable northern spotted owl nesting, roosting and foraging habitat is used as a proxy to evaluate potential fisher, wolverine, and northern goshawk habitat. Other habitat types may be used by fisher, wolverine, and goshawk especially when occurring as a mosaic with more mature stands. The proposed commercial thinning activity in alternative 2 will not affect any northern spotted owl nesting and roosting habitat in the analysis area. This alternative will downgrade and remove approximately 535 acres of potential fisher, wolverine, and northern goshawk habitat. This habitat will be removed or downgraded mostly on the upper 1/3 of slopes where stands of trees are high in disease and fuel loadings and are at risk to stand replacing wildfires.

The commercial treatment in the Goshawk Management Area will result in degradation of two acres of foraging habitat; however, foraging habitat function will be maintained after treatment. Within the project area, existing goshawk foraging habitat will be reduced by 535 acres, but nesting habitat will be treated. The treatments will remove about 535 acres of wolverine foraging habitat, but no denning habitat will be treated. Fishers denning habitat will not be treated and resting areas will remain available within skip areas within the treatment units. Fisher foraging habitat will be reduced by 535 acres.

Because this loss of 535 acres of habitat represents about 5% of the available habitat for these species, the effects of implementing alternative 2 may affect the fisher, wolverine, and northern goshawk but not lead to a trend towards federal listing of these species. The proposed pre-commercial thinning, fuels treatments, underburning, and roadside treatments are not expected to have any effect on these species since these actions are either not going to occur in suitable habitat or will not measurably alter habitat conditions.

Suitable northern spotted owl nesting, roosting and foraging habitat is used as a proxy to evaluate potential American marten where it occurs above 4,500 feet (an estimate of 1,492 acres). Alternative 2 will degrade or remove approximately 88 acres of potential marten habitat on the upper 1/3 of slopes. Because this loss of habitat represents about 5% of the available habitat for this species, the effects of implementing alternative 2 may affect the American marten but not lead to a trend towards federal listing of this species. The proposed pre-commercial thinning, fuels treatments, underburning, and roadside treatments are not expected to have any effect on this species since these actions are either not going to occur in suitable habitat or will not measurably alter habitat conditions.

With the implementation of snag-related project design features, and due to the limited activities proposed in older forested habitat, alternative 2 will not limit the availability of large snag distribution for the pallid bat, fringed-tailed myotis, Townsend's big-eared bat, or the snag-associated Management Indicator Species in the analysis area.

With the implementation of project design features related to Riparian Reserves, and due to the limited activities proposed in riparian habitat, alternative 2 will not limit the

availability of riparian habitat conditions for the willow flycatcher, northwestern pond turtle, or the riparian-associated Management Indicator Species in the analysis area.

With the implementation of hardwood-related project design features, and due to implementing treatment prescriptions that will enhance hardwoods, alternative 2 will not limit the availability of hardwoods for migratory birds and hardwood-associated Management Indicator Species in the analysis area.

Cumulative Effects

The direct and indirect effects when combined with the effects of the Glassups Timber Sale underburn Eddy Gulch Late Successional Reserve Habitat Restoration project are largely beneficial by creating a landscape with increased vegetative health, vigor and defensibility against wildfire. Treatment units are placed such that the stands are more resilient to disturbances such as disease, wildfire and drought in the long-term. Restoration will be initiated by setting stands on a trajectory to increase growth, retain species diversity, and increase resilience to natural and human-caused disturbances such as insects and disease and wildland fire. Other cumulative effects are increased protection for natural resources by increasing acres where the disease rate is reduced and the future fuel loading is decreased. Community protection is enhanced by increasing continuity of ingress/egress roadside treatments. Connectivity of natural stands adjacent to Eddy Late Successional Reserve Habitat Restoration project is retained while working towards restoring species composition and function to desired conditions. There is no expected degradation, downgrading, or removal of suitable habitat as a result of the Salmon Salvage project. Treatment areas will retain snags and coarse woody debris in stream-course riparian leave areas; large snags will be left as individual trees distributed as “skip areas.”

Alternative 3

Direct and Indirect Effects

Effects to threatened and endangered species (northern spotted owl) and critical habitat

The effects of alternative 3 will be the same as those of alternative 2 in that no nesting and roosting habitat for northern spotted owl will be treated. Unlike in alternative 2, all acres of foraging habitat will also be maintained; none will be removed. About 744 acres of foraging habitat will be degraded and remain as foraging habitat. About 15 acres of foraging habitat will be downgraded to dispersal habitat. About 27 acres of dispersal habitat will be reduced to non-habitat and 317 acres of dispersal habitat will be degraded but will remain functioning as dispersal habitat. Unlike in alternative 2, all acres of critical habitat will be maintained and none lost in alternative 3. Effects to prey species will be the same for both action alternatives, but the number of acres affected is less in this alternative thus the overall effects is less compared to alternative 2.

Effects on Forest Service Sensitive , Survey and Manage , Management Indicator Species, and Migratory Birds

Treatments in alternative 3 will degrade about 744 acres of potential fisher, wolverine, marten, or northern goshawk habitat. About 15 acres of habitat will be degraded to the point where it will no longer function as foraging habitat. Otherwise, the effects of alternative 3 will be similar as those of alternative 2, but will occur on fewer acres of

habitat. Effects of alternative 3 to other sensitive species, Survey and Manage species, Management Indicator Species, and other migratory birds will be similar to those of alternative 2, but will occur on fewer acres of habitat.

Cumulative Effects

The cumulative effects for alternative 3 are similar to those of alternative 2. There will be less habitat removal and downgrading as a result of this alternative in the short-term. The project area will be placed on a trajectory toward healthier forest stands and improved defensibility but over a smaller area than in alternative 2.

3.3.5 Compliance with Law, Policy, Regulation, and the Forest Plan

All action alternatives will comply with the Forest Plan and Survey and Manage Guidelines aimed at minimizing short-term impacts to individuals and providing for long-term wildlife population persistence as noted in the Wildlife Resource Report, Terrestrial Wildlife Biological Assessment, Terrestrial Wildlife Biological Evaluation, Management Indicator Species Report, Parts I and II, and the Forest Plan Consistency Checklist. The design of this project is consistent with Recovery Actions described in the 2011 Northern Spotted Owl Recovery Plan, the 2012 northern spotted owl critical habitat designation, and the Migratory Bird Treaty Act as well as Forest Service Sensitive Species direction.

3.4 Fish

3.4.1 Analysis Indicators and Methodology

Methodology for the analysis includes field review, literature and current research review, Geographic Information System analysis, and local expertise for the consideration of direct, indirect, and cumulative effects of the proposed action and alternatives. This methodology is described in more detail in the Aquatic Resources Report, available on the project website. Effects to fish species and habitat are related to water quality (hydrology); additional information on water quality is provided in Section 3.10 of this chapter (water quality). An explanation and results of Cumulative Watershed Effects models used to estimate effects to water quality are provided in the Water Quality (Hydrology) Resource Report, also available on the project website. Analysis indicators of potential effects to fish and their habitat, taken from indicators in the “Analytical Process for Developing Biological Assessments for Federal Actions Affecting Fish within the Northwest Forest Plan Area” (USDI, USDA, and NOAA 2004) are used in this project. Effects to indicators are used to assess the affected environment of anadromous systems, with each indicator labeled as to if it is “Properly Functioning,” “Functioning-At-Risk,” or “Not Properly Functioning” for streams within the project area. Effects of the project on the indicators may be neutral (no effect), discountable (extremely unlikely to occur), negative (effects are not able to be meaningfully measured, detected, or evaluated), or adverse (effects able to be measured). Furthermore, effects may be either positive or negative. Since analyzed species have overlapping needs and habitat, the same methods and Indicators are used to indicate effects to federally-listed, Forest Service Sensitive and Management Indicator [fish] Species (MIS).

Analysis Indicators

There are seventeen indicators of anadromous fish habitat conditions (see Aquatic Resources Report). Ten of the indicators will not be affected by the project and were not analyzed for the Jess project. The seven indicators that may be affected are temperature, sediment/substrate, turbidity, disturbance regime, peak/base flow, drainage network, and Riparian Reserves.

Temperature was evaluated by considering the estimated change in shade on perennial and late flowing intermittent streams and change in water quantity from drafting. Sediment is evaluated using the cumulative watershed effects models and field survey data. Turbidity was analyzed using professional judgment and observation of conditions after similar activities. Disturbance regime was analyzed using the cumulative watershed effects models. Peak/Base Flows, which is estimated by the Equivalent Roaded Area Cumulative Watershed Effects model, is described in the Water Quality section of this chapter and in the Water Quality Resource Report. Effects to drainage networks were evaluated using the road density, number of road crossings and number of features that have the potential to become hydrologically connected to the existing drainage network. The overall Equivalent Roaded Area risk ratio is also considered. The Riparian Reserve analysis includes impacts to shade, large wood recruitment and changes to the cumulative watershed effects models. Critical Habitat and Essential Fish Habitat are analyzed using the same indicators as impacts to fish.

Project design features, including BMPs and implementation timing limitations, are utilized to minimize effects of the proposed project on Threatened, Endangered, and Forest Service Sensitive Species.

3.4.2 Spatial and Temporal Context

The effects to aquatic resources are analyzed at the site-specific and watershed-scales. Watersheds used in this analysis are at the 5th- and 7th-field levels.

Site-specific analysis focuses on water drafting sites on the North Fork Salmon River (i.e., within the range of fish). Other proposed treatments in the project area are outside the distribution of analysis species, habitat is not present, and/or distance to occupied/suitable habitat is too distant for an effect to occur. Additional elaboration is provided in the Aquatic Resources Report to explain why effects at the site scale will not translate to impacts to fish or fish habitat. The temporal context includes short-term effects expected to occur within the first year following implementation and long-term effects occurring after one year following implementation.

3.4.3 Affected Environment

The Southern Oregon/Northern California Coasts Coho salmon (*Oncorhynchus kisutch*), including Critical Habitat, is the only threatened or endangered fish species in or around the project area. Forest Service Sensitive fish species for the Klamath National Forest in the project are the Upper Klamath-Trinity Rivers Chinook (*Oncorhynchus tshawytscha*), Klamath Mountains Province Steelhead (*Oncorhynchus mykiss*), Klamath River lamprey (*Entosphenus similis*), and Pacific lamprey (*Entosphenus tridentatus*). Both steelhead and resident rainbow trout (*Oncorhynchus mykiss*) are Management Indicator Species in the Forest Plan. Additionally, Essential Fish Habitat designation is associated with Coho salmon and Chinook salmon.

The Jess project area includes several fish-bearing streams in or near the project boundary: North Fork Salmon River, Eddy Gulch, and Jones Gulch. There are also several streams that do not have fish, the largest of which are Glasgow Gulch, Jessups Gulch, and Shiltos Creek. Table 14 displays the streams or rivers within 5th and 7th field watersheds that are either occupied by federally-listed, Forest Service Sensitive, or Management Indicator [fish] Species, have the potential to be occupied by fish, or provide thermal refugia.

Table 14. Summary of actual and potential occupancy by analysis species of creeks/rivers within 7th- and 5th-field watersheds.

Species	7 th -Field					5 th -Field
	Glasgow Gulch	Eddy Gulch	Jones Gulch	Shiltos Creek	Jessups Gulch	North Fork Salmon River
Coho (federally-listed)	N	T	T	T	T	X
Chinook (sensitive)	N	X, T	T	T	T	X
Steelhead (sensitive and MIS)	N	X, T	P, T	T	T	X
Resident Rainbow Trout (MIS)	N	X	X	N	N	X
Pacific Lamprey (sensitive)	N	P	N	N	N	P
Klamath River Lamprey (sensitive)	N	P	N	N	N	P

X = confirmed presences; **P** = potential presence; **T** = thermal refugia (for species existing in the North Fork Salmon River; thermal refugia may not be provided in streams themselves but fish species rely on tributary outflow from these streams); and **N** = does not provide thermal refugia and no confirmed or potential presence.

Temperature

Information is available only for the Eddy Gulch stream (a managed stream) within the project area. Stream temperatures slightly warmer than the 16⁰C threshold for support of beneficial uses for core juvenile rearing exist in the Eddy Gulch stream but it is still within the range to be considered “Properly Functioning.” During the warm summer months when water temperatures in the Salmon River approach 20⁰C, anadromous and resident fish rely upon cooler water habitat within tributary creeks and their confluence zones (thermal refugia). Project area creeks, Eddy Gulch, Jessups Gulch, Jones Gulch, and Shiltos Creek provide thermal refugia that juvenile salmonids rely upon when stream temperatures in the North Fork, South Fork, and main stem Salmon River are elevated.

Sediment and Substrate

As noted in the Aquatic Resources Report, limited data are available within the project area to determine sediment delivery. In general, Jones Gulch is “Properly Functioning” with modeled values for Universal Soil Loss Equation and geology model below threshold. Eddy Gulch is “Functioning at Risk” with embeddedness higher than desired even though modeled values for Universal Soil Loss Equation and geology model are

below threshold. North Fork Salmon River is also “Functioning at Risk” although modeled values for Universal Soil Loss Equation and geology model are below threshold.

Peak/Base Flow

The determination of existing condition for peak/base flows is a synthesis of Equivalent Roaded Area, road density, and vegetation condition.

- Jones Gulch – “Properly Functioning” – The Equivalent Roaded Area model is below the critical threshold, road density is low, and riparian vegetation is considered to be in good condition (Elder, *et al.* 2002).
- Eddy Gulch – “Functioning at Risk” – Although the Equivalent Roaded Area model is below critical threshold, the existing road density is moderately high (Elder, *et al.* 2002). Due to the history of mining in the drainage, there are both existing and abandoned roads, as well as multiple existing/abandoned crossings upon the Eddy Gulch main stem and tributaries. Riparian vegetation is good, but is likely also still recovering from past impacts.
- North Fork Salmon River – “Properly Functioning” – The Equivalent Roaded Area model is below critical threshold, overall road density is low (Elder, *et al.* 2002), and Riparian Reserves are considered to be functional (Elder, *et al.* 2002). Although there have been large floods (1964, 1997) which have caused channel rearrangement, the amount of Wilderness in the drainage suggests that these peak flows were most likely from natural processes rather than watershed disturbance. However, it is possible that legacy effects from past mining activity may have contributed to flood damage.

Riparian Vegetation

Riparian vegetation provides the degree of functionality required to support Coho salmon and habitat. Functionality for anadromous fish-bearing streams in the project area is shown in Table 15 below.

Table 15. Baseline for analysis indicators for anadromous fish-bearing streams in the project area.

Stream/River	Temperature	Substrate	Turbidity	Dist. History/Regime	Peak/Base Flows	Drainage Network	Riparian Reserves
Eddy Gulch	P	FAR	P	FAR	FAR	P	P
Jones Gulch	P	P	P	P	P	P	P
North Fork Salmon River	FAR	FAR	P	P	P	P	P

P - "Properly Functioning"

FAR - "Functioning-at-Risk"

NF - "Not Properly Functioning"

3.4.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under alternative 1, no management actions will be taken.

Cumulative Effects

There will be no cumulative adverse impacts to fisheries resources from alternative 1; without direct or indirect effects, there cannot be cumulative effects from the alternative 1.

Alternative 2

Direct and Indirect Effects

Temperature

The effects of drafting to water temperature will be minimal due to the large size of the stream and the project design features. Project design features and the input of additional cold water from tributaries below the drafting site will minimize any reduction in temperature caused by the reduction in stream flows. There will be no short-term change in stream shade (Section 3.10- Water Quality) because of the treatment buffers and site specific prescriptions for treatments in the Riparian Reserve. The impacts to fish habitat due to changes in temperature will be discountable in the short-term. There are benefits to stream shade and temperature discussed in Section 3.10 Water Quality.

Sediment/Substrate

There is a low/moderate risk of sediment mobilizing at the site scale, but no to low risk of sediment moving past the reach scale (300 feet of stream channel) (Section 3.10 - Water Quality). Sediment producing activities will be at least two miles from fish habitat. There will be a neutral effect on fish habitat from sediment from the Jess project. The risk ratio for the Equivalent Roaded Area model for all of the watersheds in the project area will remain under the threshold of concern and the watersheds will remain functioning at their current level in the short-term. Addressing the legacy sites and hydrologically stabilizing the temporary roads on existing roadbeds will reduce the amount of sediment potential for delivery to streams. This will help the watersheds onto a trajectory of improved function over the long-term.

Turbidity

Turbidity created by work on stream crossings to address legacy sediment sources will occur primarily while the work is being done and is minimized by the project design features. These crossings are at least 2.4 miles away from fish habitat. The effects to fish habitat from crossing improvements will be neutral. Impacts to turbidity due to drafting activities have been observed to be momentary, localized and quickly dissipating. The drafting in the non-fish bear streams will not impact fish habitat. Fish are expected to avoid areas where drafting is occurring. This avoidance behavior together with the short-term impacts will have a discountable effect on fish habitat.

Disturbance Regime

The disturbance regime will not be impacted by the project. The cumulative watershed effects models, while increased a small amount by the project, will remain under the threshold of concern.

Constructing and reoccupying existing landings and skid trails will increase the risk of to the drainage network. Road systems can have a major impact to the drainage network. The project design features will minimize impacts to risk to the drainage network. The impacts will be upslope from fish habitat, localized and short-term. The impacts to fish habitat will be discountable.

Riparian Reserve

Except for water drafting in the North Fork Salmon River, there are no activities proposed adjacent to fish habitat and the associated Riparian Reserves. Project design features will minimize impacts to Riparian Reserve function upstream of fish habitat including maintaining shade and minimizing sediment delivery. The impacts to fish habitat will be neutral.

There will be neutral effects to Coho Critical Habitat and Essential Fish Habitat. Except for water drafting, all project activities will occur in association with or adjacent to fishless headwater systems distant from occupation by anadromous species. All habitat Indicators for Critical Habitat will be neutral, discountable, or changed insignificantly by the project. Where changes to indicators occur, they are not to the magnitude where the functioning ability of any of the Habitat Indicators is changed. The determination of effects on Threatened, Endangered, Sensitive or Management Indicator Species are summarized in Table 15.

Table 15. Summary of findings for Threatened/Endangered species, Sensitive Species, and Management Indicator Species.

Species	Special Status	¹ Determination
<i>Fishes</i>		
Coho Salmon (and Critical Habitat)	Federally-listed as Threatened	May Affect, Not Likely to Adversely Affect
Coho Salmon Critical Habitat	-----	May Affect, Not Likely to Adversely Affect
Chinook Salmon (Spring/Fall runs) (Upper Klamath-Trinity Rivers)	Forest Service Sensitive	May affect individuals, will not lead toward a trend to listing or loss of viability
Steelhead Trout (Klamath Mountains Province)	Forest Service Sensitive and Management Indicator Species	May affect individuals, will not lead toward a trend to listing or loss of viability
Rainbow Trout	Management Indicator Species	May affect individuals, will not lead toward a loss of viability

Species	Special Status	¹ Determination
<i>Fishes</i>		
Pacific Lamprey	Forest Service Sensitive	May affect individuals, will not lead toward a trend to listing or loss of viability
Klamath River Lamprey	Forest Service Sensitive	May affect individuals, will not lead toward a trend to listing or loss of viability
<i>Other Habitat</i>		
Essential Fish Habitat (Coho/Chinook)	-----	May adversely affect

Cumulative Effects

Adding the effects of alternative 2 of the Jess project to the effects of the Glassups Timber Sale and the overlapping areas of Eddy Gulch Late Successional Reserve Habitat Restoration project with the watersheds analyzed will not impact stream temperature, sediment or peak flows in fish-bearing streams or riparian vegetation in the surrounding areas. Adding the effects of alternative 2 of the Jess project to the road work to be completed by the Lower North Fork Roads Stormproofing project will cumulatively reduce sediment delivered to the streams. The Equivalent Roaded Area remains below the threshold of concern when the effects of alternative 2, Eddy Late Successional Reserve Habitat, Glassups Timber Sale, and the North Fork Roads Stormproofing project are all included in the model (see Section 3.10 – Water Quality).

Alternative 3

Direct and Indirect Effects

Effects of alternative 3 will be the same as for alternative 2 except impacts will be slightly smaller since there will be decreased ground disturbance and less disturbance of riparian vegetation. There will be less impact on peak flows (ERA modeled risk will be less). Any risk of overland transport of sediment to streams as a result of harvest will also decrease because the no-equipment/no-entry Riparian Reserve buffer for all commercial harvest units.

Cumulative Effects

Cumulative effects will be the same as described under alternative 2.

3.4.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Alternatives will meet Forest Plan Standards and Guidelines as noted on the Forest Plan Consistency Checklist, available on the project website. Alternatives will also be in compliance with the Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act, and all other relevant regulations, laws, and policies. An agreed-upon Biological Assessment to meet the requirements of the Endangered Species Act Section 7 consultation was completed with the National Marine Fisheries Service for the Preferred Alternative and a letter of concurrence was received on April 1, 2014.

3.5 Botany

3.5.1 Analysis Indicators and Methodology

This section evaluates the Jess project in sufficient detail to determine its effects on federally-listed Endangered, Threatened, Proposed, Forest Service Sensitive, and Survey and Manage plant species. The Jess Botany Biological Assessment/Biological Evaluation, Survey and Manage Review, and Pre-field documents: Appendices A-1, A-2, and A-3 are summarized below, incorporated by reference and available on the project website.

The analysis indicators for measuring the effects of the Jess project are based on law, policy, and direction related to plant species. Section 7 of the Endangered Species Act of 1973, as amended, and Forest Service Policy direct Federal agencies to ensure that any action authorized, funded, or permitted by such agencies is not likely to jeopardize the continued existence of 1) species listed, or proposed to be listed as Endangered or Threatened by the U.S. Fish and Wildlife Service, and 2) species listed as Sensitive by the Regional Forester of the Pacific Southwest Region, or to cause a trend to federal listing for species listed as Sensitive. Analysis indicators of the effects of the project are (1) changes in plant species population viability, and (2) change or maintenance of habitat characteristics and microclimate conditions at the site of these plant species and of species of concern identified as Survey and Manage species (see the Survey and Manage Review for detailed information). The significance of management activities upon plant species viability depends upon many factors, including the size of known populations, the wider geographic range of known plant populations outside of the project area, and the degree of species sensitivity to short-term and long-term habitat modification. The alternatives are evaluated in terms of how they would affect plant species viability in the context of these factors.

3.5.2 Spatial and Temporal Context

The spatial boundary is the population boundary and surrounding stand components that contribute to the habitat characteristics within the population. Short-term effects are those that occur at the time of implementation and up to three years thereafter. Long-term effects may occur more than three years after implementation.

3.5.3 Affected Environment

A pre-field and preliminary field review determined that this project is not within the documented range or habitat of any federally-listed species that is Threatened, Endangered, or Proposed for federal listing. The preliminary field review of the project area indicated that ten Forest Service Sensitive and/or Survey and Manage plant species are within range and habitat of the Jess project area. Sensitive plant species for which populations or habitat exist in the project area are *Cypripedium fasciculatum*, *Cypripedium montanum*, *Boletus pulcherrimus*, *Cudonia monticola*, *Dendrocollybia racemosa*, and *Phaeocollybia olivacea*. One Survey and Manage species, *Otidea leporine*, is present in the project area. Project specific surveys were conducted in 2011, 2012, and 2013 to confirm the findings of the pre-field and preliminary field review; multiple populations of three species of concern were discovered or re-inventoried in these surveys (Table 17). Field surveys conducted for the Jess project were adequate to

determine presence of Threatened, Endangered and Sensitive (not identified in pre-field analysis) and Survey and Manage plant species. No known sites of Forest Service Sensitive fungi exist in the project area. Bear grass occurs in scattered populations within the project area, primarily on ridge tops, and within patches of open canopy and rocky ultramafic soils.

Table 17. Plant species of concern for which populations are present in the project area.

Species	Status
<i>Cypripedium fasciculatum</i>	Sensitive/Survey & Manage
<i>Cypripedium montanum</i>	Sensitive/Survey & Manage
<i>Otidea leporina</i>	Survey & Manage

3.5.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

There may be indirect effects to Forest Service Sensitive and Survey and Manage plant species and their habitat due to the changes in habitat characteristics over time because of epidemic levels of dwarf mistletoe. This will most likely not affect populations to the extent that there will be a loss of species viability. There will be no direct effects on Sensitive plants from alternative 1.

No federally-listed threatened, endangered, or proposed plant species will be affected by this alternative. Under alternative 1, the Jess project may affect individuals but is not likely to result in a trend toward federal listing or a loss of viability for the Sensitive species for which populations or habitat exist in the project area: *Cypripedium fasciculatum*, *Cypripedium montanum*, *Boletus pulcherrimus*, *Cudonia monticola*, *Dendrocollybia racemosa*, and *Phaeocollybia olivacea*. No direct or indirect effects to the Survey and Manage species *Otidea leporina* from alternative 1 are likely. High quality habitat for this species will persist within the documented sites in the project area. The bear grass will not be affected by this alternative.

Cumulative Effects

Adding the minor effects of this alternative to the effects of underburning as part of the Glassups project will not lead to a loss of plant species viability. Previous and ongoing management actions have addressed fuels conditions adjacent to the Survey and Manage species habitat within the project area, leaving the habitat less vulnerable to stand-replacing fire. Adding the effects of this alternative to the effects of ongoing and reasonably foreseeable future actions will not negatively affect high quality habitat for *Otidea leporina*. There is no direct or indirect effect to bear grass so there will be no cumulative effects.

Alternative 2

Direct and Indirect Effects

There may be direct effects to a few Forest Service Sensitive plant species individuals as a result of removing small diameter fuels by hand from within known sites; this is not likely to affect the species viability within the population. Project design features will be incorporated into this alternative to protect known populations of Forest Service Sensitive

plant species. There will be no change to species' viability within the project area, on the Forest, or throughout the range of the species due to this alternative.

No federally-listed threatened, endangered, or proposed plant species will be affected by this project. Under alternative 2, the Jess project may affect individuals but is not likely to result in a trend toward federal listing or a loss of viability for the Forest Service

Sensitive plant species for which populations or habitat exist in the project area:

Cypripedium fasciculatum, *Cypripedium montanum*, *Boletus pulcherrimus*, *Cudonia monticola*, *Dendrocollybia racemosa*, and *Phaeocollybia olivacea*. In this alternative there will be no direct effect to Survey and Manage plant species individuals because there are no proposed activities within the known population of *Otidea leporina* and there will be no indirect effect to populations or habitat with the incorporation of project design features. For the Forest Service Sensitive fungi species of concern, project design features included in this project will protect Sensitive fungi if they occur within a treatment unit. Specifically, the Forest Plan Standards and Guidelines for woody material retention will be implemented to maintain Sensitive fungi habitat components and implementation of the Aquatic Conservation Strategy Standards and Guidelines will maintain Sensitive fungi habitat components of riparian habitat (section 2.2.4, Watershed-40).

There is bear grass present in the project area. In particular, there is a large population of bear grass in tractor unit 103. Past management activities including commercial thinning have occurred within this unit. In unit 103, the bear grass is located within a young plantation and along old skid roads indicating that it responds well to activities that open the canopy. Observations in timber harvest areas within Oregon and Washington indicate that bear grass does not respond well to clear cutting activities primarily due to soil compaction (Hummel et al. 2012); however, the activities proposed in the Jess project are thinning prescriptions with Best Management Practices (appendix D) and project design features (section 2.2.4) incorporated into the proposed action to minimize soil disturbance and compaction. Thinning activities within this unit and other units in the Jess project will have minimal negative impacts to the species viability within the project area. Based on the location and abundance of bear grass within units that have been managed in the past, the Jess project may have the beneficial effect of creating habitat into which the plant populations can expand. Fire is well known to have beneficial effects to bear grass populations and has been used as a tool to enhance bear grass by Native American tribes (Hummel et al. 2012) and by the Forest in other locations. Prescribed burning within the bear grass populations in the Jess project area will not impact species viability, and will most likely be beneficial to these populations.

Cumulative Effects

The only on-going project in the analysis area that impacts Sensitive plant species or Bear Grass is the Glassups Timber Sale underburning. The underburning in the Glassups Timber Sale is designed to minimize impacts on the currently viable populations of *Cypripedium fasciculatum*, *Cypripedium montanum*, *Boletus pulcherrimus*, *Cudonia monticola*, *Dendrocollybia racemosa*, and *Phaeocollybia olivacea*. The effects of the two projects together will not result in a trend toward federal listing or compromise the viability of the populations. There are no effects to the Survey and Manage species so there are no cumulative effects. The burning in Glassups Timber Sale underburn will

improve habitat for bear grass, so when added to alternative 2 there will be a benefit to bear grass habitat.

Alternative 3

Direct and Indirect Effects

The effects of this alternative on all Forest Service Sensitive plant species are the same as for alternative 2 even though fewer acres will be treated and treatments in riparian reserves are more restrictive. Project design features will be incorporated into this alternative to protect known populations of Sensitive plant species. The effects to Survey and Manage plant species (specifically *Otidea leporina*) are the same as for alternative 2 even though acres of treatment and types of treatments in riparian reserves are different. The project design features described in the Survey and Manage Review will be incorporated into this alternative if chosen. The effects to bear grass are the same as in alternative 2.

Cumulative Effects

The cumulative effects will be the same as for alternative 2.

3.5.5 Compliance with Law, Policy, Regulation, and the Forest Plan

The Jess project complies with Forest Service Policy and with Forest Plan Standards and Guidelines for Forest Service Sensitive plant species as displayed in the Forest Plan Consistency Checklist, available on the project website. The Jess project complies with the 2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines (USDA Forest Service, USDI Bureau of Land Management, 2001).

3.6 Non-Native Invasive Species

3.5.1 Analysis Indicators and Methodology

This section evaluates the Jess project in sufficient detail to determine the risk of introducing or spreading non-native invasive plant species (noxious weeds). The Jess project Weed Risk Assessment is summarized below, incorporated by reference and available on the project website.

The analysis indicators for measuring the effects of the Jess project on noxious weeds species of concern are based on policy, and direction. Factors other than the project that affect the introducing or spread of non-native invasive plant species are

- Presence of noxious weed in or adjacent to the project area;
- Habitat vulnerability; and
- Non-project dependent vectors.

Analysis indicators of the effects of the project are:

- Habitat alteration expected as a result of the project; and
- Risk of introducing or spreading weeds based on these alterations.

Forest Service Manual 2900 Invasive Species Management (USDA Forest Service, 2011b) includes a policy statement calling for a risk assessment for noxious weeds to be

completed for every project. Management includes reducing management related introduction and spread of noxious weeds on the Forest (USDA Forest Service, 2001). Forest Plan includes Forest-wide Standards and Guidelines for vegetative management that calls for all silvicultural practices to consider how to best prevent introducing noxious or alien weeds (Forest Plan, page 4-50). Additional direction is found in Executive Order #13112.

Inventory in the project area was conducted from 2002 to 2013 by the Forest Noxious Weed program. Project-specific surveys were conducted in 2011, 2012, and 2013. Surveyors were trained in the identification of the target species.

3.5.2 Spatial and Temporal Context

The spatial boundary is the project area and adjacent access roads. The short-term temporal boundary is directly after project implementation and long-term is the time required for disturbed areas to recover, five to ten years.

3.5.3 Affected Environment

Six infestations of the noxious weed species Dyer's woad (*Isatis tinctoria*, also known locally as Marlahan mustard) exist in the project area as discovered during inventories. Monitoring data show that these sites are expanding even though these infestations have been treated by hand pulling methods in past years.

3.5.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Implementation of alternative 1 will result in no increase in suitable habitat for noxious weeds from project-related activities since no such activities will be implemented. Suitable habitat for weeds decreases with full canopy closure; lack of disturbance and maintenance of the canopy will continue to discourage the establishment of weeds, allowing native plant species to occupy the majority of the habitat in the project area. Other factors that contribute to the introduction and establishment of weeds, such as transport on vehicles travelling through the project area, livestock and wildlife spread of weeds, and spread of existing roadside noxious weeds will continue as will efforts to contain these infestations.

There is an overall low risk of noxious weed introduction and spread from this alternative.

Cumulative Effects

Adding the minor effects of alternative 1 to the effects of ongoing and reasonably foreseeable future actions will not provide substantial cumulative effects.

Alternative 2

Direct and Indirect Effects

In this alternative, the risk factors combined have a moderate potential for new weed introduction and existing weed spread within the project area. Alteration of habitat in the short-term and long-term, and presence of known weed occurrences in the project area, can provide opportunities for weeds to spread or become established. Noxious weed habitat can be created when soil is disturbed, competing vegetation is removed and bare soil is exposed. Noxious weeds have developed strategies that allow them to out-compete native species by germinating and occupying land faster than native species under environmental conditions that are not as well tolerated by native species. Underburning may affect the introduction of noxious weeds by reducing protective duff and making bare soil available or by releasing seeds. Areas of pre-established weed infestation will be at the greatest risk of spread since the seed is already present in the soil.

Implementing project design features has a high level of effectiveness in preventing weed establishment and spread, as displayed in the Forest Plan monitoring reports (USDA Forest Service, 2013b); these design features will be implemented in this alternative as will Forest efforts to contain infestations. The overall potential for direct and indirect effects on weed-spread within the project is low as displayed in the Weed Risk Report. The post-project implementation of weed monitoring and treatment of existing weed locations will prevent the spread of weeds to new locations. Quickly treating these sites by hand pulling methods has a high probability of preventing new weed sites from establishing.

Cumulative Effects

The ongoing and reasonably foreseeable future actions that will affect the spread of weeds are Glassups project underburning, the Eddy Gulch Late Successional Reserve Habitat Restoration project and the Lower North Fork Road Decommissioning and Stormproofing projects. The environmental effects of these projects on weed-spread are disclosed in the separate environmental analyses; project design features minimize negative effects of these projects to the spread of weeds. Adding these effects to the effects of alternative 2 will not add up to measureable effects. The risk of weed introduction and spread remains low in the project area.

Alternative 3

Direct and Indirect Effects

The risk of noxious weed introduction and spread will be somewhat less than alternative 2 (low risk) because alternative 3 proposes a reduced amount of commercial treatment within the project area. This treatment reduction eliminates the overlap with infestation ISTI-221 and tractor unit 105. Noxious weeds project design features will not be necessary for unit 105 in this alternative (section 2.2.4, Noxious Weeds-2 and Noxious Weeds -3).

Cumulative Effects

Cumulative effects of this alternative, added to the effects of ongoing and future actions, are the same as for alternative 2 although slightly less because of fewer acres treated in alternative 3.

3.5.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Forest Service Manual 2900 and Forest Plan Standards and Guidelines require that all projects be evaluated for the risk of noxious weed introduction and spread as a result of project activities. In addition, projects must be designed to reduce the risk of weed introduction or spread. In the action alternatives, project design features have been incorporated into the actions which are expected to reduce the risk of weed introduction and spread. Forest Plan Standards and Guidelines and Manual direction will be met as noted in the Forest Plan Consistency Checklist, available on the project website.

3.7 Geology

3.7.1 Analysis Indicators and Methodology

The Forest Service Manual Chapter 2880 (Geologic Resources, Hazards and Services) requires the assessment of the risk of loss of life, property and natural resources from both naturally-occurring and management related landslides. The risk must be minimized or mitigated when possible. The Forest Plan directs the interdisciplinary team to manage vegetation on unstable lands to maintain or enhance slope stability (Forest-wide Standard and Guideline 2-1, page 4-18). Project-level review of the unstable lands is required to validate the current mapping (Forest-wide Standard and Guideline 2-2, page 4-18). Unstable lands are defined as active landslides, inner gorges, toe zones of dormant landslides and severely-weathered and dissected granitic lands. These features are considered Riparian Reserves (Forest Plan Standard and Guideline MA10-2, page 4-108).

Field reviews were completed to validate existing geomorphic mapping and to determine if treatment on unstable lands was appropriate to maintain or enhance slope stability. Landslide rates are affected by vegetation management activities by the concentration of surface water on hillslope, reduction in root support and reduction in interception of precipitation by vegetation. Landslide rate is indirectly affected by some forest management activities and is difficult to measure directly due to the complex and stochastic nature of landslide events. The analysis indicators are proxies for such processes. A landslide event is defined for this analysis as a large-scale, extensive episode resulting in several landslides that can interrupt ingress/egress, modification of fluvial processes on 3rd to 5th order streams or damage major infrastructure across a 7th field watershed. Details on the methods and analysis are in the Geology Resource Report which is incorporated by reference and available on the project website.

Analysis Indicators

Landslide volume is estimated by the Cumulative Watershed Effects Geology (GEO) model (Geology Resource Report) and represents the magnitude of a landslide event. This indicator uses the empirical mathematical GEO Cumulative Watershed Effects model to estimate the volume of sediment delivered to the mouth of a 7th field watershed due to all types of landsliding during a ten-year storm event. The coefficients in the mathematical equation were developed in the Salmon River basin and the model assumes the geomorphic landforms react identically regardless of elevation. The indirect effects

will be analyzed using the landslide volume estimates attributed to the alternative relative to the existing condition volume estimates.

Landslide risk is the chance of effects of injury or loss as a measure of the probability and adverse consequences to safety, property or natural resources (see appendix A of Geology Resource Report). Landslide likelihood is determined by geomorphic landform, disturbance, landslide modeling, and road density. The analysis uses existing geomorphic mapping, bedrock mapping and historical landslide information to determine the likelihood of landsliding. The consequences of a landslide are based on the impacts to Elements at Risk. The Elements at Risk for this analysis are dispersed campsites, ingress/egress, Sawyers Bar municipal water source (Jessups Gulch), fish habitat and water quality in a Key Watershed (North Fork Salmon River 5th field watershed).

The GEO model risk ratio is used in indicating cumulative effects of this project and other ongoing or reasonably foreseeable future actions; it is calculated as two times the “background” landslide volume over the current landslide volume. The threshold of concern for the risk ratio is 1.0. A risk ratio greater than or equal to 1.0 is a yellow flag and calls for a closer look at mitigation opportunities. See Cumulative Watershed Effects: the Abridged Version (USDA Forest Service, 2012).

3.7.2 Spatial and Temporal Context

The spatial scale for analysis is the 7th field watershed scale. The models used for analysis are calibrated at a 7th field scale. The temporal scale is from immediately after project implementation to ten years after for short-term and more than ten years for long-term. Elevated landslide rates due to forest management in northern California have been shown to begin to decrease around seven to 12 years after the disturbance.

3.7.3 Affected Environment

The project area is within four 7th field watersheds, Eddy Gulch, Jessups Gulch, Shiltos Creek and Olsen Creek. The current landslide volumes estimated for the analysis area are about 16,000 cubic yards per decade, 18,400 cubic yards per decade, 17,200 cubic yards per decade, and 83,200 cubic yards per decade for Eddy Gulch, Jessups Gulch, Shiltos Creek, and Olsen Creek respectively. Ninety-eight percent, 88% and 85% of the landslide volume from past management activities in Eddy Gulch, Jessups Gulch and Shiltos Creek respectively are related to the existing road system. The 2013 Salmon River Complex wildfire is the reason for almost 75% of the landslide volume modeled by the GEO model.

For Eddy Gulch and Jessups Gulch, a landsliding event is likely. The likelihood of a landsliding event is highly likely for Shiltos and Olsen Creek. Shiltos Creek has a high road density and Olsen Creek has an elevated GEO risk ratio due to the 2013 Salmon River Complex. All of the watersheds have ingress/egress, fish habitat and water quality (not related to potable water) as Elements at Risk. Jessups Gulch also is a municipal watershed (potable water). There are a few dispersed campsites in the analysis area but they are set off from stream channels and are not likely to be affected by landsliding. The landslide risk under current conditions is moderate in Eddy Gulch and high in the other three watersheds.

The risk ratios for Eddy Gulch, Jessups Gulch and Shiltos Creek are under the Threshold of Concern. Olsen Creek; however, has a risk ratio of 1.73 which is over the Threshold of Concern of 1.0. The elevated risk ratio is due to the effects of the 2013 Salmon River Complex that occurred on the northern half of the 7th field watershed, outside of the project area.

3.7.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under this alternative no management actions will occur. There are no direct or indirect effects to landslide volume or risk.

Cumulative Effects

There are no direct or indirect effects for this alternative; therefore, there are no cumulative effects.

Alternative 2

Direct and Indirect Effects

The landslide volume for alternative 2 is increased by less than 1% for Eddy Gulch, Shiltos Creek and Olsen Creek 7th field watersheds. The landslide volume is increased by almost 8% for Jessups Gulch. The modeling does not account for implementation of the project design features (section 2.2.4) prescribed to minimize the impacts of the project on Riparian Reserves. The treatments in inner gorges are limited by the commercial harvest and equipment exclusion zones. There is also a decrease in the road-related landsliding volume as a result of the hydrologic stabilization of the temporary roads on existing roadbeds.

The percent of headwaters with harvest or prescribed burning, and the Cumulative Watershed Effects Model risk ratios, are increased by the alternative but not enough to increase the overall landslide risk in any of the 7th field watersheds. The temporary roads on existing roadbeds are included in the current road per mile calculation for this analysis because in their current condition they influence landslide rates in the watershed. System road density does not change at all by this alternative. However, the miles of non-system roadbeds contributing to the landslide rate will be decreased by two miles because of the hydrologic stabilization that will occur.

Jessups Gulch, Shiltos Creek and Olsen Creek have high landslide risk. According to the risk matrix (appendix A of the Geology Resource Report) mitigations need to be prescribed to mitigate impacts. There are 45 project design features prescribed in section 2.2.4 of this document (Watershed-1 through Watershed-45) that are intended to minimize impacts to watershed health and landslide rates.

Cumulative Effects

Cumulative effects of the Jess project are estimated by adding the effects of alternative 2 to recent past and current actions in the project area and reasonably foreseeable future actions. The recent past and current actions include the North Fork Roads Stormproofing project, Eddy Gulch LSR Habitat Restoration project, Glassups Timber Sale and the road work done under the Burned Area Emergency Response. The future action analyzed for cumulative effects is the Salmon Complex Fire Salvage. The model assumes no measureable impact to slope stability as the result of salvage logging so there is no additional landslide volume as a result of the future action.

Eddy Gulch, Jessups Gulch and Shiltos Creek are under the threshold of concern (risk ratio greater than 1.0) for the GEO model. The watersheds are not likely to experience adverse impacts to the landslide rates as a result of the addition of the proposed and future actions. Olsen Creek is over the threshold of concern with a risk ratio of 1.73. The portion of the watershed on the north side of Salmon River (outside of project area) was affected by the Salmon Complex Wildfire. The elevated Cumulative Watershed Effects risk ratio does imply that the likelihood of landsliding during a ten-year storm event is highly likely. However, the cumulative risk of landsliding will remain in the high category because of the nature of the Elements at risk in the watershed. Adding the effects of alternative 2 to the effects of other projects will not increase the landslide risk for the watersheds analyzed.

Alternative 3

Direct and Indirect Effects

The footprint of alternative 3 is smaller than alternative 2 and, therefore, it has similar but smaller effects on landslide volume and landslide risk.

The landslide volume for alternative 3 is increased by less than 0.1% for Eddy Gulch, Shiltos Creek and Olsen Creek 7th field watershed. The landslide volume is increased by only 2% for Jessups Gulch. The modeling does not account for implementation of the project design features (section 2.2.4) prescribed to minimize the impacts of the project on Riparian Reserves.

Just as in alternative 2, the percent of headwaters with harvest or prescribed burning and the Cumulative Watershed Effects model risk ratios are increased by the alternative but not enough to increase the overall landslide risk in any of the watersheds. The overall landslide risk for the 7th field watersheds remains the same in alternative 3 as alternative 2.

Cumulative Effects

The cumulative effects of alternative 3 are the same as in alternative 2 except the risk ratio for Jessups Gulch is 0.46 in this alternative instead of 0.51 as in alternative 2.

3.7.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Existing mapping was field-verified by the Forest Geologist; unstable lands are removed from treatment areas where slope stability is not benefitted by treatment. The landsliding magnitude and risk were analyzed for all of the alternatives in the project. The risks associated with the project are minimized by implementation of project design features.

Action alternatives are in compliance with law, policy, regulation and the Forest Plan as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.8 Air Quality

3.8.1 Analysis Indicators and Methodology

Siskiyou County is identified as attainment or unclassified for carbon monoxide, sulfur oxides, lead, and respirable particulate matter for both state and federal standards.

Siskiyou County is in “non-attainment/transitional” status for the state 8-hour ozone standards. Therefore, compliance with the General Conformity Rule for nitrogen oxides must be analyzed for this project. Prescribed burning activities release greenhouse gas including carbon dioxide and methane into the air which could contribute to climate change. Currently, there are no thresholds for greenhouse gas emissions for prescribed burning activities. The Council on Environmental Quality recommends that Federal agencies disclose in the NEPA analysis the effects of climate change for actions that are estimated to emit more than 25,000 metric tons of carbon dioxide equivalents annually.

The emissions for the criteria pollutants nitrogen oxides, sulfur oxides, and particulates for mobile sources are estimated using an emissions factor model. Emissions of nitrogen oxides, sulfur oxides, particulates, carbon dioxide and greenhouse gases from prescribed burning were estimated using the First Order Fire Effects Model. First Order Fire Effects Modeling is recognized by the Forest Service Pacific Southwest Region as being the most current and accurate analysis tool available for emissions prediction.

The criteria pollutant emissions are presented as U.S. tons per year for ease of comparison to the General Conformity Rules *de minimis* thresholds. Greenhouse gases are presented in metric tons of carbon dioxide equivalent per year which is the standard metric for presenting greenhouse gases.

Analysis Indicators

- Estimated emissions of Criteria Pollutants (nitrogen oxides, sulfur oxides, and particulates) for each alternative.
- Estimated effects on greenhouse gas emissions for each alternative.

3.8.2 Spatial and Temporal Context

Emissions from mobile sources such as logging trucks and tractors, as well as from prescribed burning, are transient and the impacts are short-lived. Along with this, the air quality regulations are in terms of one-year emissions. In light of this, the temporal analyses are on an annual basis and this is considered short-term. Impacts are considered long-term if they persist for more than a year. The cumulative effects of the mobile source emissions, fugitive dust and smoke emission will be addressed on the 6th field watershed scale.

3.8.3 Affected Environment

According to California Air Resource Board website (www.arb.ca.gov) the ambient air in portions of the Siskiyou County Air Quality Management District exceeds the State particulates standard during many of the winter months. Siskiyou County is identified as attainment or unclassified for carbon monoxide, sulfur oxides, lead, and particulates for

both state and federal standards. Therefore the project is exempt from conformity determination for these pollutants. The Air Management District is in “non-attainment/transitional” status for eight-hour ozone, a product of volatile organic compounds or nitrogen oxides.

The project area is located adjacent to Sawyers Bar, California, in Siskiyou County. The project area consists primarily of forested federally-managed lands with no substantial human-caused emission sources within the area other than emission and fugitive dust from logging and recreation. Other emission contributions are smoke and haze from seasonal wildfires and prescribed fires from both within and outside the county. The area-wide sources, primarily from prescribed forest burning, account for a majority of the carbon dioxide and particulate matter emitted in the county. The nitrogen oxide emissions are primarily from heavy-duty diesel trucks. The sulfur oxide emissions for 2015 are expected to be driven by wildfire (natural source) emissions. The project area is approximately 1.5 miles south of the Marble Mountain Wilderness, which is a Class I wilderness and is protected under the Regional Haze Rule.

3.8.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under alternative 1, there will be no new emissions of criteria pollutants or greenhouse gas from activities because there are no project-related actions.

Cumulative Effects

There are no direct or indirect effects to criteria pollutants or greenhouse gases; therefore, there are no cumulative effects.

Alternative 2

Direct and Indirect Effects

Alternative 2 will produce criteria pollutant and greenhouse gas emissions from the exhaust of mobile sources and hauling activities. These emissions may impact visibility and air quality for the community of Sawyer Bar and the surrounding area. The criteria and greenhouse gas emissions from prescribed burning may impact visibility and air quality in Sawyers Bar and possibly in the Marble Mountain Wilderness during implementation. The emissions are not anticipated to exceed the General Conformity Rule *de minimis* values for nitrogen oxides.

The alternative will emit and estimated 20,300 metric tons of carbon equivalents. However, the areas treated with prescribed fire are likely to not only re-sequester the carbon released during treatment but be able to surpass unmanaged stands in the amount of additional carbon stored in the long-term (Hurteau and North, 2010).

Cumulative Effects

The cumulative effects on ozone will comply with the General Conformity Rule and will remain under the regulatory standard. Greenhouse gas emissions are estimated to be 30,360 metric tons of carbon equivalent per year from the future actions. When added to

the 20,300 metric tons of carbon equivalents the cumulative emissions is 50,660 metric tons of carbon equivalents. The cumulative effects of alternative 2 on air quality are expected to be minimal with the oversight of the Siskiyou County Air Pollution Control District (section 2.2.4, Air Quality-2). Criteria pollutant and greenhouse gas emissions will not degrade air quality cumulatively with activities occurring in the surrounding area. These emissions are expected to be minimal and able to disperse readily. Compliance with Burn Day, Marginal Burn Day, and No Burn Day designation, and coordination with and permitting from the Siskiyou County Air Pollution Control District, will minimize cumulative effects of prescribed fire. Adding the effects of alternative 2 to the effects of other projects will comply with the Conformity Rule and will have minimal impacts to visibility in Sawyers Bar and the Marble Mountain Wilderness.

Alternative 3

Direct and Indirect Effects

The effects of alternative 3 are the same as for alternative 2. There will be slightly fewer emissions due to the fewer acres of burning. The alternative will emit an estimated 16,000 metric tons of carbon equivalents.

Cumulative Effects

The cumulative effects of alternative 3 are similar to alternative 2. The cumulative greenhouse gas emissions from alternative 3 and the future actions will be about 46,360 carbon equivalents per year. Since there are slightly few tons/year emitted from alternative 3 than alternative 2, the emission from this alternative added to cumulative emissions are smaller. Adding the effects of alternative 3 to the effects of other projects will comply with the Conformity Rule and will have minimal impacts to visibility in Sawyers Bar and the Marble Mountain Wilderness.

Comparison of Effects

Cumulative emissions for criteria pollutants with the action alternatives are compared in Table 18 below.

Table 16. Estimated cumulative emissions for criteria pollutants.

Criteria Pollutant	Future Action (tons/year)	Alt 2 + Future (tons/year)	Alt. 3 + Future (tons/year)
Particulates	495.2	723.1	678.6
Carbon monoxide	5473.7	7858.3	7397.0
Nitrogen oxides	12.9	33.9	29.3
Sulfur dioxide	21.9	35.9	33.0

3.8.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Alternatives 2 and 3 are not anticipated to result in an adverse impact to air quality. Therefore, the current attainment status for all but ozone within Northeast Plateau Air Basin is expected to continue. The emissions are not anticipated to exceed the General

Conformity Rule *de minimis* values for nitrous oxides. Therefore, the project complies with the General Conformity Rule and with the Forest Plan, as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.9 Soils

3.9.1 Analysis Indicators and Methodology

The analysis of effects of individual management activities on the soil resource (soil productivity and soil ecosystem functionality) is guided using the Forest Plan Standards and Guidelines and Forest Service Manual 2500, Chapter 2550, Supplement 2500-2012-1. Three indicators were chosen that best address relevant soil-related issues in the project and measure compliance with Forest Plan Standard and Guidelines. The indicators include soil stability, soil organic matter, and soil structure.

The unit measures for each indicator are acres not meeting desired conditions. Soil stability desired conditions are not met when major portions of the area lack soil cover and/or lack effective erosion control measures. Soil organic matter desired conditions are not met when major portions of the area have had the upper soil layer displaced or removed to a depth and area large enough to affect productivity for the desired plant species. Soil structure desired conditions are not met when major portions of the area have reduced infiltration and permeability capacity indicated by soil structure and macro-porosity changes.

The proposed activities for the project were categorized into similar activity types. For example, all of the various silviculture treatments that use ground-based equipment were lumped into “Ground Based Tractor Logging with Associated Landings.” The projected acres not meeting desired conditions for each indicator and activity type were determined from data collected from previous projects on the Forest using the National Forest Soil Disturbance Monitoring Protocol. Details on the methods and analysis can be found in the Soil Resource Report which is incorporated by reference and available on the project website.

3.9.2 Spatial and Temporal Context

For all three soil indicators, the analysis area is bounded by the project activity units where soil-disturbing activities take place. The analysis is further bounded in time by the foreseeable future period during which effects of this project can persist as detectable, significant effects. Short-term effects can be seen immediately after project implementation. In the longer term, soil cover, as it affects soil stability, can recover quickly as needles and other organic debris are deposited on the forest floor. The temporal boundary for soil stability is five years. Soil organic matter can take from years to decades to rebuild after it is lost through displacement or erosion. The temporal boundary for soil organic matter is 30 years. Once compacted, structure can remain affected for decades. The temporal boundary for soil structure is 30 years.

3.9.3 Affected Environment

The majority of soils in the project area developed from metavolcanic parent material. The soils found on dormant landslide deposits are deep (up to 200 inches) gravelly loams that have moderate productivity. The soils outside dormant landslide deposits are more shallow (40 inches deep) extremely gravelly loams with low soil productivity. Found in

small pockets throughout the project area are soils developed from serpentine parent material. These soils are deep (up to 200 inches) gravelly loams with moderate soil productivity.

Erosion hazard rating is a relative measure of the sensitivity of soils to erosion processes. Soil disturbance has the potential to increase the erosion hazard because soil cover is generally reduced. Erosion hazard rating was calculated for each of the treatment units to estimate the potential erosion hazard for a given soil type. First, a maximum erosion hazard rating was calculated for soil that is completely bare to determine the risk of soil loss in areas without protection from soil cover. The maximum erosion hazard rating for all treatment areas is high. The erosion hazard rating for the current conditions of treatment areas was then calculated using data collected on existing conditions of soil cover. Current soil erosion hazard ratings for soils in treatment areas, based on existing conditions, are low.

Using a unit selection strategy based on soil sensitivity and type of management activities planned, 13 units were selected for survey of existing soil conditions. The selected units are all proposed for ground based equipment harvest. The average slope within these units ranges from 23% to 40% with an overall average of 30%. Average existing total soil cover ranges from 77% to 100% and averages 92%. Existing coarse woody debris (logs greater than 20 inches in diameter) in the sampled units ranges from 0.8 to 13.6 logs per acre and averages 5.6 logs per acre.

Using the National Forest Soil Disturbance Monitoring Protocol, approximately 88% of the surveyed units were rated as disturbance class 0 (undisturbed), 5% were rated as class 1, 7% were rated as class 2, and 0% rated as class 3. The types of disturbances found include topsoil displacement on old full bench constructed skid trails, rutting on old skid trails, and compaction on old skid trails and landings. Desired conditions for soil stability are met across the entire project area because soil cover levels are very high and no signs of erosion are found. Desired conditions for soil organic matter and soil structure are met on an average of 95% of the project area.

3.9.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Direct effects of alternative 1 will be no effect on the soils, as soil-disturbing project activities will not take place. Soil cover for erosion protection will not change in the project area. Soil organic matter will continue to accumulate faster than decomposition rates with no additional benefit to soil fertility. Soil structure conditions will remain the same in the short-term, with very slow long-term natural recovery of old skid trails and landings. Indirect effects of alternative 1 will be an increased accumulation of organic matter in terms of surface and ladder fuels with a corresponding continual increase in fire hazard.

Cumulative Effects

Past actions including timber harvest and thinning are evident on the landscape in the project area and are reflected in the discussion of the affected environment. The Glassups Timber Sale underburn is an ongoing action that will occur in the project area. With

project design features in place to limit burning to low and moderate intensities, and minimum guidelines for post-project soil cover levels, the Glassups Timber Sale underburn is not expected to affect desired conditions for soil stability, soil organic matter, or soil structure. Since there are no other ongoing or reasonably foreseeable future actions that will occur in the project area that have an effect on soils, there will be no cumulative effects from adding the effects of the Glassups Timber Sale underburn to the effects of alternative 1.

Alternative 2

Direct and Indirect Effects

With treatments in this alternative, the number of acres that will not meet desired conditions for soil structure, soil organic matter, and soil structure is minor in relation to the total treatment area, and is reduced to the extent possible with project design features (section 2.2.4).

Ground-based tractor logging in some units with associated landings will result in reduced levels of soil cover on skid trails and landings but implementation of project design features will reduce the potential for soil erosion. A combination of increased compaction, reduced soil cover, and soil displacement will lead to a loss of nutrients on the skid trails and landings in units where ground-based tractor logging takes place. Project design features, including slope limitations, minimizing impacts to coarse woody debris and the high priority of using existing skid trails, will minimize impacts to soil erosion and productivity. Skyline cable logging in other units will result in small amounts of soil displacement in the yarding corridors from the tail end of the log dragging on the soil surface. This log dragging usually does not occur over the entire corridor length and, when properly water barred, no significant erosion will leave the harvest units. Soil compaction and reduced soil porosity from commercial harvest will be minimal to none.

Machine mastication will maintain the high levels of existing cover by cutting the existing live and dead standing material into smaller pieces and letting it fall to the soil surface. Machine mastication will have a slight impact on soil organic matter because fine surface fuels will be increased but there will be minimal disturbance to the topsoil. Slight increases in compaction will occur in travel access corridors around the unit.

Roadside hazard tree removal will cause small amounts of soil displacement in the yarding corridors for each felled tree. Existing high levels of soil cover will function to minimize soil exposure. Desired conditions for soil stability, soil organic matter, and soil structure will be met for roadside hazard tree removal treatments.

The impacts of prescribed fire on fuel loads and surface soil conditions can vary considerably depending on fuel characteristics and loading, soil climatic conditions at the time of burning, and resulting soil burn severity. Following soil cover guidelines, soil stability desired conditions are expected to be met for prescribed fire and pile burning treatments.

Temporary roads on existing roadbeds will be cleared and graded, reducing soil cover levels during project operations. Temporary roads will be hydrologically stabilized and closed after project completion, mitigating long term erosion in the project area.

Monitoring from previous projects has shown that, with the implementation of project design features, ground-based and skyline harvest, mastication, prescribed burning and temporary road use meet desired soil conditions greater than 90% of the time. Alternative 2 will maintain adequate soil cover, protect soil organic matter, and maintain soil structure at levels sufficient to protect soil productivity and prevent soil erosion. A full description of how the proposed activities may impact soil function can be found in the Soil Resource Report, available on the project website.

Cumulative Effects

Past actions including timber harvest and thinning are evident on the landscape in the project area and are reflected in the discussion of the affected environment. The Glassups Timber Sale underburn is an ongoing action in the project area. With implementation of project design features in place to limit burning to low and moderate intensities, and minimum guidelines for post-project soil cover levels, the Glassups Timber Sale underburn is not expected to impact desired conditions for soil stability, soil organic matter, or soil structure. Since there are no reasonably foreseeable future actions that will occur in the project area that have an effect on soils, adding the effects of the Glassups Timber Sale underburn to the effects of alternative 2 will not have a measurable cumulative effect.

Alternative 3

Direct and Indirect Effects

The proposed activities that have a potential to impact soil stability, soil organic matter, and soil structure are the same as for alternative 2. The acreage treated with ground-based tractor and skyline logging is less than that of alternative 2 while acres of roadside fuels treatments are increased compared to alternative 2. The overall effects of alternative 3 on soils are similar to those of alternative 2.

Cumulative Effects

The cumulative effects of alternative 3 are the same as alternative 2.

3.9.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Forest Plan Standards and Guidelines for soils will be met for all alternatives as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.10 Water Quality

3.10.1 Analysis Indicators and Methodology

The effects of the Jess project were analyzed through field visits, Geographic Information System reports and modeling. All streams were evaluated for shade and overall health of the stream. Units that may potentially be thinned were selected for field review if current stream layers indicated that streams were within or adjacent to units, or units included or were adjacent to other landforms such as inner gorges and terrain subject to landslides because these situations may create water quality concerns. The field visits helped develop the project design features that will be implemented based on stream channel characteristics and slope breaks. In addition, the Forest Road Sediment Source Inventory was used to inventory legacy sediment sources and to assess the risk to water quality.

Information was collected to allow analysis of the compliance of the project alternatives with the North Coast Regional Water Quality Control Board Waiver of Discharge requirements (North Coast Regional Water Quality Board, 2010).

Cumulative Watershed Effects models are used to evaluate the risk associated with action alternatives. Three models are used. The Equivalent Roded Area (ERA) model is used to estimate changes in peak runoff flows influenced by ground-disturbing activities in action alternatives. The geological cumulative watershed effects model (GEO) compares the landslide sediment production of action alternatives to the production if the watershed was undisturbed. The Universal Soil Loss Equation (USLE) model estimates sediment delivered to a stream channel. The modeled risks are based on the effects of actions or events and do not take into account the project design features that minimize negative effects to sediment delivery, landslide potential, or peak flows.

Details regarding the methods, analysis and the Cumulative Watershed Effects Modeling can be found in appendix A of the Water Quality Resource Report, available on the project website.

Analysis Indicators

- Sediment delivery to streams (estimated by both geologic and Universal Soil Loss Equation models)
- Changes in peak flow/base flow (estimated by the Equivalent Roded Area model)
- Changes to temperature (estimated by stream shade or canopy cover)
- Channel condition (estimated by potential change in conditions)

Impacts to beneficial uses for watersheds and riparian areas within the project area will be determined using these analysis indicators.

3.10.2 Spatial and Temporal Context

The watershed spatial scales include the 5th, 6th and 7th field watersheds. The North Fork Salmon River 5th field watershed is composed of six 6th field watersheds and twenty five 7th field watersheds. The Jess project is located within four of the twenty-five 7th field watersheds. Effects are measured or estimated at the following spatial scales: (1) Site (effects are located in stream channels adjacent to or near treatment areas and do not extend downstream); (2) Reach (effects extend downstream for less than 100 meters); and (3) Watershed (effects can be measured in the response reach of a 7th field watershed).

The temporal scale may be either short- or long-term in duration. Short-term effects are usually evident in one to three years but can be evident for up to ten years after project implementation. Long-term effects are those that persist for more than ten years.

3.10.3 Affected Environment

As a tributary to the Klamath River, North Fork Salmon River is listed in the 303(d) Clean Water Act for stream temperature impairment as discussed in the Water Quality Resource Report. Beneficial uses considered impaired include cold freshwater habitat; rare, threatened, and endangered species; migration of aquatic organisms; spawning, reproduction, and/or early development of fish. As a result of 303(d) listing, the Klamath River Stream Temperature Total Daily Maximum Load was developed to (1) reduce and

prevent excess sediment inputs that influence stream temperature and (2) maintain and restore site potential stream shade in an effort to decrease water temperatures. To help implement these goals, a waiver of waste discharge requirements for non-point sources on federal lands (waiver) was developed that includes (1) treatment of legacy sediment sources and (2) maintenance or improvement of stream shade. A stream sediment and temperature monitoring program is required to document existing conditions, develop reference conditions and track recovery of water bodies. Stream monitoring for sediment and temperature on a Forest-wide sample of “managed” and “reference” streams is displayed in annual monitoring reports as noted in the Water Quality Resource Report for Jess.

The only stream within the project area that is included in the Forest-wide monitoring is Eddy Gulch (a managed stream) which approximated or met reference conditions for sediment and temperature. However, it is possible that some beneficial uses of this stream may be impaired because the subsurface sediment size is on the margin of not meeting reference conditions and stream temperature during one of the monitored years is slightly warmer than the desired temperature for core juvenile salmonids.

All watersheds within the project area are currently modeled as below the Threshold of Concern for Cumulative Watershed Effects except one 7th field watershed (Olsen Creek-North Fork Salmon River; Table 19). Olsen Creek is a “compound” watershed consisting of drainages north and south of the North Fork Salmon River; the drainages are not physically connected to each other. Elevation of this watershed above the Threshold of Concern is linked to events that occurred on the north drainage; the Jess project is in the south drainage.

The 7th field watersheds within the project are characterized by well-confined, steep-gradient, high-energy, low-order streams. These streams carry large sediment along the bed of the channel. The monitoring of the Eddy Gulch stream channel indicates that it is within the natural range of variability for pool depth and substrate composition (USFS, 2013c).

Table 17. Modeled current conditions (risk ratios) by watershed with risk ratios over Threshold of Concern in bold.

	Current Risk Ratio		
7th field Watershed	USLE¹	GEO²	ERA³
Eddy Gulch	0.96	0.75	0.40
Jessups Gulch-North Fork Salmon River	0.29	0.42	0.26
Olsen Creek-North Fork Salmon River	0.52	1.73	0.37
Shiltos Creek-North Fork Salmon River	0.66	0.67	0.27
5th Field Watershed			
North Fork Salmon River	0.36	0.75	0.21

- 1- USLE risk ratios are calculated by dividing accelerated sedimentation values due to surface sediment erosion by an inference point value of 400 percent. Accelerated sedimentation is figured as “percent over background,” which is calculated from ‘current’ model-estimated sediment delivery less background divided by background values.
- 2- GEO risk ratios are calculated by dividing accelerated sedimentation values due to mass-wasting by an inference point value of 200 percent. Accelerated sedimentation is figured as “percent over background,” which is calculated from ‘current’ model-estimated sediment delivery less background divided by background values.
- 3- ERA risk ratios are calculated by dividing ERA values by an inference point value equal to the Threshold of Concern.

3.10.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Alternative 1 will not actively move existing conditions towards desired conditions. Most of the of the fill material contained in legacy sites will still be available to be delivered to tributaries of North Fork Salmon River during a large storm event; this may result in adverse effects to water quality. Without treatment in this alternative, the five legacy sites that have not been treated by other projects will continue to produce soil erosion and increase the potential for landslides. Alternative 1 will not result in any short- or long-term improvements to watershed condition. Although modeled risk ratios will slowly recover, stream sediment measured in response reaches is expected to remain the same or increase as untreated legacy sites continue to chronically or catastrophically fail over time.

Under alternative 1, fuels will continue to accumulate due to tree mortality as a direct result of insect infestation and disease attacks as noted in the Vegetation section of this chapter. This will lead to decreased shade on late-flowing intermittent and perennial streams in the project area and increase temperatures, impairing downstream beneficial uses.

Cumulative Effects

Adding the effects of this alternative (no action) to the effects of ongoing and reasonably foreseeable future actions will not measurably affect stream temperature or shade as measured by cumulative watershed effects modeling. None of the risk ratios will change measurably as displayed in the Water Quality Resource Report. The effects to water quality of not treating five legacy sites, when added to the effects of treating 20 legacy sites by other projects (Lower North Fork Salmon roads decommissioning and stormproofing project), may be measurable at the site or reach scale but are not large enough to affect risk ratios at the watershed scale. Effects of this alternative on channel conditions in the future, added to the effects of ongoing or reasonably foreseeable future actions, will not produce substantial cumulative effects on this indicator.

Alternative 2

Direct and Indirect Effects

Sediment Regime

All project activities, including temporary road on existing roadbed, hydrologic stabilization and legacy site mitigation, will increase the likelihood of sediment delivery at the site scale to stream channels in the short term. In the short-term, there will be an estimated increase in sediment delivery to stream channels and landslide potential as a result of alternative 2 of about 10% for the Jessups Gulch-North Fork Salmon River 7th field watershed and less than 1% for the other 7th field watersheds. The effects to the sediment regime at the site scale in the long-term, and at the watershed scale in the short and long term, will not be discernible. The mitigation of legacy sites and the hydrologic stabilization of temporary roads on existing roadbeds will reduce the potential sediment delivery by 9.5 cubic yards per year and landslide potential by 901 cubic yards per decade. There will be some short-term increase in sediment at the site-scale where existing landings in Riparian Reserves are being used (units 108, 110, 118 and 119). However, in the long-term there will be a benefit to the sediment regime because reusing the existing landings means that there will be four fewer acres of landings in the watershed.

Peak/Base Flow

In the short, summer low flows and annual water yield will be slightly increased from the reduction in evapotranspiration at the site and reach scale but not be affected at the 7th field watershed scale (due to the overall small area in which activities will take place in proportion to the size of the watershed). Peak flows are expected to increase less than 10% in the short-term, an amount which is less than is measurable during an average year. The effects to peak flow and base flow in the long-term will be neutral. The vegetation will quickly respond to the vegetation management and evapotranspiration will be back at pre-project levels in less than ten years.

Temperature

The thinning proposed in the outer 70 feet of Riparian Reserves (the area of Riparian Reserves in which thinning is most likely to occur) occurs mainly in intermittent streams that do not flow past July most years. However, the treatment on the late-flowing intermittent and perennial stream channels will not reduce shade in streams in the short-term. The topography is such that trees more than 100 feet from the channel are not providing a measurable amount of shade to the streams. Prescribed fire is expected to remove less than 5% of the canopy (see the Fuels and Fire section of this chapter and the Fuels and Fire Resource Report, available on the project website) and there is limited burning in Riparian Reserves. In the long-term, canopies of the young vigorous trees will regenerate existing stream shade within a decade. The increase in large trees in the Riparian Reserve, along with the decrease in mistletoe infection rates, will improve shade and decrease water temperatures at the site and reach scale which will have a minor positive effect on temperature at the watershed scale.

Channel Conditions

Short-term effects to channel geomorphology from skidding logs across ephemeral and intermittent streams will directly affect channel conditions in the short-term at the site-scale only. Implementation of Best Management Practices and project design features will minimize negative effects. Treatments designed to retain coarse woody debris in Riparian Reserves and ensure future recruitment will help maintain channel geomorphology as will treatments and project design features to ensure large woody debris recruitment to streams. There is not expected to be an increase in landslide risk (see Section 3.7.4) so there are no changes to the channel expected from debris flows or landslides.

Riparian conditions in the watersheds are expected to improve. Riparian Reserve conditions in the Jessups Gulch-North Fork Salmon River 7th field watershed will be improved by a reduction in road density from 2.71 miles per square mile to 2.37 miles per square mile; road density will not change in any other watersheds within the project area. One stream crossing will be removed. Riparian Reserves will benefit from the improved stand health due to the treatments that decrease mistletoe infection, reduce tree mortality, and encourage the growth of more large trees per acre.

Beneficial Uses

The beneficial uses will be neutrally affected in the short-term. Sediment will be increased by less than 10%, there is no measureable affect to peak or base flow, stream shade will not be reduced, and with project design features there will be only local impacts to channel condition. In the long-term, improved tree growth in the Riparian Reserves and the increased stand health will increase stream shade in the treatment units. As a result of addressing the legacy sites and the hydrologic stabilization of temporary roads on existing roadbeds, there will be a reduction of the potential of sediment delivery to stream channels in the 7th field watersheds.

Cumulative Effects

The other projects in the analysis area will have long-term beneficial impacts to forest and watershed health. The Eddy LSR will improve forest health in the Eddy Gulch watershed. Glassups Underburning, an on-going project in Jessups Gulch, will continue to reduce the fuel loading in portions of the watershed helping to keep the fire behavior less severe. The Burned Area Emergency Response road work in the Olsen Creek watershed and the North Fork Roads Stormproofing project will improve watershed health by treating roads for diversion potential, undersized culverts and other drainage issues.

The elevated risk ratios do not change for Eddy Gulch or Olsen Creek from alternative 1 (Table 20), therefore the proposed action will not affect sediment regimes for those watersheds. All other watersheds are well below the Threshold of Concern. The sediment regime and flow regime will not affect beneficial uses.

Table 20. Alternative 2's influence on cumulative watershed effects risk ratios (numbers in parentheses indicate the increase in risk ratio from no action).

	Risk Ratio after treatments (Increase in Risk Ratio)		
7th field Watershed	USLE	GEO	ERA
Eddy Gulch	0.96 (0)	0.75 (0)	0.45 (0.05)
Jessups Gulch-NF Salmon River	0.36 (0.07)	0.51 (0.09)	0.70 (0.44)
Olsen Creek-NF Salmon River	0.52 (0)	1.73 (0)	0.40 (0.03)
Shiltos Creek-NF Salmon River	0.66 (0)	0.67 (0)	0.36 (0.09)
North Fork Salmon River 5th Field	0.36 (0)	0.75 (0)	0.23 (0.02)

Alternative 3

Direct and Indirect Effects

Effects of alternative 3 are the same as for alternative 2 with the following exceptions:

For sediment regime, there is an estimated increase in sediment delivery to stream channels as a result of alternative 3 of about 6% for the Jessups Gulch-North Fork Salmon River 7th field watershed and less than 1% for the other 7th field watersheds in the short-term. The sediment potential due to legacy site treatments and hydrologic stabilization of the temporary roads on existing road beds over the long-term will be reduced similarly to alternative 2.

There will be no treatments in the Riparian Reserve. Tree growth will remain slow and mortality increased because of the epidemic mistletoe levels. Mortality related openings in Riparian Reserve canopy will reduce stream shade in the long-term. Large woody debris recruitment to streams will be delayed and large tree enhancement will take longer to achieve.

Cumulative Effects

Cumulative effects of alternative 3 will be nearly identical to alternative 2 except the risk ratios are slightly lower because of the reduction of acres treated (Table 21).

Table 18. Alternative 3's influence on cumulative watershed effects risk ratios (numbers in parentheses indicate the increase in risk ratio from no action).

	Risk Ratio after treatments (Increase in Risk Ratio)		
7th field Watershed name	USLE	GEO	ERA
Eddy Gulch	0.96 (0)	0.75 (0)	0.41 (0.01)
Jessups Gulch-NF Salmon River	0.34 (0.05)	0.46 (0.04)	0.39 (0.13)
Olsen Creek-NF Salmon River	0.52 (0)	1.73 (0)	0.39 (0.02)
Shiltos Creek-NF Salmon River	0.66 (0)	0.67 (0)	0.32 (0.05)
North Fork Salmon River 5th Field	0.36 (0)	0.75 (0)	0.22 (0.01)

3.10.5 Compliance with Law, Policy, Regulation, and the Forest Plan

The conditions in the Waiver of Waste Discharge Requirements for Nonpoint Source Discharges Related to Certain Federal Land Management Activities on National Forest System Lands in the North Coast Region are met for this project as detailed in the Water Quality Resource Report. Meeting the Waiver requirements equals compliance with the Clean Water Act. Forest Plan standards are met by consistency with the Aquatic Conservation Strategy, as displayed in appendix F and the Forest Plan Consistency Checklist, available on the project website.

3.11 Society and Culture

3.11.1 Analysis Indicators and Methodology

Qualitative indicators normally used to evaluate the effects of projects on the social environment include changes in community capacity, lifestyles, values and beliefs. For this project, an important social indicator is community safety as discussed in the Sawyers Bar Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004) and safety of firefighters, forest workers and visitors. Quantitative indicators include employment (number of full-time jobs) and income. Indicators of any disproportionate effects on segments of the population (including racial and ethnic composition), employment, and poverty are used to estimate effects on civil rights and environmental justice.

Because most jobs related to the project will come from the activities related to vegetation management, job creation resulting from implementation of the proposed action and alternatives is estimated based on the predicted volume output from sale of the timber as described in section 3.12.4.

3.11.2 Spatial and Temporal Context

One area used for analyzing social effects of projects is any local community within or adjacent to the project area, based on zip code. However, margins of error are large in the demographic information; the zip code (96097) includes the town of Etna as well as the local community of Sawyers Bar so information is not available at the local community scale. A larger area, for which more data are available, is Siskiyou County, California. When information is not available for local community, Sawyers Bar is assumed to be similar to the county as a whole; where specific information is available, effects of the Jess project will be displayed for the local area. Short-term effects are those which occur during implementation of the project because effects on quantitative measures can be seen during this time. Long-term effects occur after project implementation with decreasing effects over time.

3.11.3 Affected Environment

Like Siskiyou County, Sawyers Bar has seemed to maintain relatively steady social and economic indicators in the past two decades. Siskiyou County's population in 2012 was 44,154 people, decreasing by less than 1% since 2000 (U.S. Census Bureau 2013). Employment in the county was also relatively constant over the last decade, decreasing from 17,704 workers in 2000 to 16,510 workers in 2012 (US Department of Labor Bureau of Labor Statistics 2012). Adjusted to 2010 dollars, personal income per capita

from 2006-2010 was \$22,179 (compared to \$29,188 for California as a whole) (U.S. Census Bureau 2012). In Sawyers Bar, as in the county, personal income consists of labor and non-labor income. Non-labor income includes dividends, interest, and rent (money earned from investments) and transfer payments (payments from governments to individuals such as Medicare, Social Security, unemployment compensation, disability insurance payments and welfare). Approximately 50% of income in Siskiyou County is from labor sources and 50% is non-labor income. The proportions of labor and non-labor income in Siskiyou County have fluctuated slightly over the years but have not significantly changed since 1995 (US Department of Commerce Bureau of Economic Analysis 2009). The percentage of non-labor income coming from transfer receipts has increased somewhat with a decrease in the percentage from dividends, interest and rent; non-labor income from transfer receipts was 51% in 2000 and 59% in 2007 (US Department of Commerce Bureau of Economic Analysis 2009).

Unemployment in Siskiyou County since has ranged from 12.2% in 1990 to 16.6% in 2011 (Department of Labor Bureau of Labor Statistics 2012). Sawyers Bar is likely to have experienced similar unemployment although statistics are not available for the local community.

Lifestyles, attitudes, beliefs and values of Sawyers Bar and Siskiyou County residents are similar to those of rural residents in other counties in the western United States. Many local residents depend on the environment to support them, both professionally and personally; this, in turn, affects their lifestyles and attitudes. “The Code of the West: the Realities of Rural Living” (Siskiyou County 2005) sheds light on some of the conventions of living in Siskiyou County. “The right to be rural” is a fundamental theme among residents. The rugged terrain of the Forest contributes to the isolation of many communities, and further promotes a rural lifestyle. Self-reliance, interdependence between neighbors, and close interaction with the outdoors are important benefits of living in Siskiyou County. This theme directly relates to the use of Forest resources, and to the desire among many residents to see the Forest resources being used to economically benefit the County. The Siskiyou County Comprehensive Land and Resource Management Plan (Siskiyou County 1996) emphasizes the use of natural resources.

The ability of these communities to respond to stresses and take advantage of opportunities to meet community needs (known as community capacity) is fluid. According to researchers who studied the Mid-Klamath communities (communities near but not adjacent to the project area), the infrastructure (underlying framework) is limited (Doak and Kusel 1997, Charnley et al. 2006). In the Sawyers Bar area, however, the community has coalesced to develop the Community Wildfire Protection Plan that emphasizes the need for short- and long-term safety, indicating an increased community capacity.

Environmental Justice and Civil Rights

All federal actions are required to consider the potential of disproportionate effects on minority and low-income populations by the Executive Order 12898. The principles of environmental justice require agencies to address the equity and fairness implications associated with federal land management actions. The estimated racial distribution of

Siskiyou County consists of Caucasians, American Indians and Alaskan Natives, Blacks or African Americans, Asians or Pacific Islanders, and other races.

The racial distribution of Siskiyou County is mostly Caucasian, with almost 88% identifying themselves as White persons; 95% of the population identify themselves as one race and approximately 5% identify themselves as being of two or more races (U.S. Census Bureau 2013). American Indian and Alaskan Native, Black or African American, and Asian/Pacific Islanders are the other races identified. Approximately 80% identify themselves as non-Hispanic and 11% as Hispanic or Latino (of any race). Only American Indian and Alaskan Natives are present in a larger percentage in the county (4%) than in California as a whole (1%). Nineteen percent of Siskiyou County residents are below the poverty line (U.S. Census Bureau 2013).

The American Indian and Alaska Native (also known as Native American) population is greater in percentage (4%) than its percentage of the population in California (1%). Since the number of Native American people is greater in the County than in the State, the Jess project assesses the effects on Native Americans to determine compliance with Executive Order 12898. Siskiyou County also has a greater percentage of persons 65 years and older (almost 20%) than the State (11%) so effects to older persons are also analyzed.

Nineteen percent of residents in Siskiyou County from 2008-2012 were living below poverty level (U.S. Census Bureau 2013). Comparable figures for the State of California as a whole are about 15% (U.S. Census Bureau 2013). Since the number of people below the poverty level is greater in the county than in the State, the Jess project assesses the effects on low income populations in Siskiyou County to determine compliance with Executive Order 12898.

The civil rights policy of USDA requires each agency to analyze the civil rights impact(s) of its decisions. This socioeconomic analysis substitutes for a civil rights impact analysis in that the possible adverse or disproportionate impacts of this project on individuals based on their membership in a protected group are disclosed. Protected groups are defined in law and include common characteristics including race, gender, national origin, age, disability and others. Siskiyou County is similar to other counties in California except for proportion of Native Americans, persons below poverty level, and persons 65 years old and over; therefore, civil rights analysis and disclosure focuses impacts on these groups to determine compliance with civil rights law and the USDA civil rights policy.

3.11.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

The effects on the social environment of Siskiyou County from taking no action (alternative 1) are a continuation of the current situation in terms of employment and distribution of jobs among racial and ethnic groups, older and low-income residents. Effects on community capacity, lifestyles, values, and beliefs will not change. Although the project area is not likely to experience a high-severity wildfire in the short term, in the long term increased mortality in the project area will affect the safety of local residents,

firefighters, forest workers and visitors. The magnitude of effects on private property cannot be accurately estimated.

Cumulative Effects

The added effects of alternative 1 plus the effects of reasonably foreseeable future actions including the North Fork Roads Stormproofing project, Eddy Gulch Late Successional Reserve Habitat Restoration project, Glassups Underburning, Salmon Salvage project, and Burned Area Emergency Rehabilitation work on the social environment will not be measureable or cumulatively substantial. Reasonably foreseeable projects may have a minor effect on job creation and other economic factors; this is addressed in the environmental analysis for these projects. However, the cumulative effects of these projects plus the effects of alternative 1 on the social environment are minor.

Alternative 2

Direct and Indirect Effects

Alternative 2 is estimated to add 73 full-time jobs, most likely within Siskiyou County, with no unequal distribution of jobs among racial and ethnic groups, or older residents. See section 3.12.4 for additional detail on the types of jobs that will be created. Changes in lifestyles, values, attitudes and beliefs due to implementation of the Jess project are likely to be immeasurable due to the small size of effects from the project. However, safety will increase with implementation of alternative 2 due primarily to an increasing continuity of ingress/egress roadside treatments. Changes in community capacity due to the Jess project are not likely to be measurable due to the small influence of the project and the larger impact of other activities on the community capacity of the county; however, some positive effects on community capacity of Sawyers Bar are likely from the implementation of some priorities from the Community Wildfire Protection Plan. There will be no negative effect on civil rights or environmental justice; there will be no disproportionate effects on Native Americans, low-income persons, or older persons.

Cumulative Effects

The added effects of alternative 2 with the effects of reasonably foreseeable future actions including the North Fork Roads CE (road stormproofing), Eddy Gulch project, Glassups Timber Sale underburning, Salmon Salvage project, and Burned Area Emergency Response work on the social environment will not be measureable or cumulatively significant. Although the cumulative job creation from Eddy Gulch project (estimated 96 jobs) and the Jess project (estimated 73 jobs) will provide a temporary benefit to the local community, the magnitude of overall effects is not substantial in the long term. The effects of alternative 2, added to the effects of reasonably foreseeable projects, will have a minor effect on job creation and other social factors within the county.

Alternative 3

Direct and Indirect Effects

Alternative 3 is expected to add 17 full-time jobs, most likely within Siskiyou County, with no unequal distribution of jobs among racial and ethnic groups. The direct and indirect effects of alternative 3 will be the same as for alternative 2 except that the number of jobs created related to timber removed will yield a reduced benefit.

Cumulative Effects

The cumulative social effects of alternative 3 will be the same as for alternative 2.

3.11.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Alternative 1 will not improve the economic conditions of Sawyers Bar, as encouraged by the Forest Plan, nor improve safety for Sawyers Bar. All action alternatives are in compliance with law, policy, regulation and the Forest Plan.

Overall Forest Plan direction and guidance relevant to the social environment includes a Forest-wide goal of managing for the long-term, broad-scale stability of local communities (Forest Plan, Environmental Health and Community Stability, page 4-4). Action alternatives will move the project area toward this goal.

3.12 Economics

3.12.1 Analysis Indicators and Methodology

Several steps were taken to estimate the logging costs and economic viability of the project.

- 1) Plot data were gathered to determine the number, size and species of trees within each unit boundary.
- 2) Data were input into Access database for use in the Forest Vegetation Simulator which calculates volume estimates for both standing volume and harvest volume.
- 3) Forest Vegetation Simulator provided output regarding tree species breakdown by unit and estimated harvest volume based on unit prescriptions by volume and species. The volumes provided in the Forest Vegetation Simulator output were adjusted based on professional judgment of the relationship between the system's numerical output and what exists on the ground. The number of jobs created is determined based on estimates of volume to be harvested.
- 4) Logging system information was derived from a combination of on-the-ground field evaluation and the use of orthophotography. The ArcMap Geographic Information System was utilized to estimate number of corridors for skyline systems, skid roads for ground-based systems and landing locations.
- 5) Information derived from Forest Vegetation Simulator and ArcMap were input into the LogCost spreadsheet to estimate the stump-to-truck logging costs. Similar inputs were also put into the Sale Economic Evaluation spreadsheet. The intended use of this spreadsheet is to estimate the economic viability of planned Federal timber sales (residual value method). The user inputs the data necessary to make the determination in various tables. The summary table displays items such as the advertised rate, base rate, timber value, whether or not the unit and/or sale is estimated to be deficit or not, and the estimated value the sale is above (or below) base rates. The evaluation is based on the residual value appraisal methodology.

Analysis Indicators

- **Timber Value** - The analytical or residual value appraisal method determines fair market value by subtracting all manufacturing and harvesting costs and an allowance for profit and risk from the value received for the end products produced. Appendices A and B of the Economics Resource Report, available on the project website, show the details of inputs for calculating this value.
- **Stump-to-Truck costs** - The cost of harvesting standing timber is an indicator of the economic viability of the project. Stump- to-truck logging costs are calculated using the LogCost version 14.0 program to determine the economic viability of the project. Appendices C and D of the Economics Resource Report show the summary of values for each alternative.
- **Jobs Created** - The number of jobs created is an indicator that addresses specific concerns about effects on the local timber dependent communities within the region. Although this number is not likely to reflect new job creation, it is sustaining employment for those already working in the industry over the duration of the project. Appendix H of the Forest Plan estimates state-wide employment effects of changes in harvest levels. Ten to twenty person- years of employment per million board-feet or 180 hundred cubic feet of timber harvested are estimated to be generated as a result of timber harvest activity.

3.12.2 Spatial and Temporal Context

The spatial boundary for the analysis of jobs created is the county of Siskiyou. Although resources may come from outside this boundary, it is likely that most of the economic impact will take place within the county or the effects will be comparable in adjacent counties. The spatial boundary of analysis of timber value is limited to the project area since many factors contributing to timber value are relative to location and specific site characteristics.

The short-term duration of the project may vary from three to ten years, providing employment opportunities for logging, planting, noncommercial thinning, masticating, and monitoring. It is during this time period that economic effects of the project (especially job creation) are most likely to be noticeable in county-wide data. Economic effects beyond ten years are not likely to be noticeable.

3.12.3 Affected Environment

The Jess project is located entirely within Siskiyou County, a large, remote rural county located in inland Northern California adjacent to the Oregon border. See the description of the affected environment in the Society and Culture section of this chapter for additional information on employment, income, and economic aspects of the county.

3.12.3 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under this alternative no vegetation or fuels management activities will occur. The economic effects of taking no action are a continuation of the current situation in terms of distribution of jobs among racial and ethnic groups. No new jobs will be created from this

alternative. The economic effect of taking no action contributes to the decrease of manufacturing (which includes forest products) jobs in the county, which decreased from 1,843 in 1990 to 1,672 in 2000 (US Department of Commerce Bureau of Economic Analysis, 2012) and to 736 in 2010 (US Department of Commerce Bureau of Economic Analysis, 2012). This statistic includes lumber mills and logging operations. The continuation of the county's economic situation is dependent upon a continuous supply of raw material to manufacture products. Implementation of alternative 1 will neither support nor add to the demand for employment in this sector.

The economic effects of taking no action are a continuation of the current situation in terms of employment and distribution of jobs among racial and ethnic groups and those below the poverty level.

Cumulative Effects

Adding the effects of reasonably foreseeable future actions in the project area to the direct and indirect effects of taking no action in the Jess project will not be cumulatively substantial because the scale of effects of all projects added together will still be small.

Alternative 2

Direct and Indirect Effects

The proposed action estimates 13,325 hundred cubic feet will be available for harvest. Using the metric described above, alternative 2 is estimated to add 73 full-time jobs, most likely within Siskiyou County. Implementing alternative 2 will help to slow the decline in the manufacturing sector. Local saw mills, timber purchasers, and contractors tend to appreciate the values that a small number of jobs can bring to rural communities. With that, contractors and purchasers more often use a local work force for the logging and hauling. The timber value is estimated to be 1.46 million dollars, bringing positive economic effects to the county.

Cumulative Effects

Implementation of alternative 2a, added to the economic effects of reasonably foreseeable future actions will result in a steady supply of wood commodities over several years in addition to providing job opportunities in the short term. There will be a temporary and minor reduction in unemployment in Siskiyou County and a minor positive cumulative impact of this project on economic well-being in Siskiyou County.

Alternative 3

Direct and Indirect Effects

Alternative 3 estimates 3,800 hundred cubic feet will be available for harvest. Treatments in alternative 3 are expected to add 17 full-time jobs, most likely within Siskiyou County. Timber value is estimated to be 429,270 dollars. The effects of alternative 3 are the same as alternative 2, although to a lesser degree due to the reduced area of treatment proposed for harvest and fewer cubic feet of timber removed.

Cumulative Effects

The cumulative effects of alternative 3 are similar to those of alternative 2 although slightly less positive.

3.12.4 Compliance with Law, Policy, Regulation, and the Forest Plan

Programmatic management direction for the Forest is provided by the Forest Plan which Forest Plan standards and guidelines direct the Forest to promote economic stability of local communities through timber harvest and wood fiber extraction to the extent possible and consistent with other goals, objectives and standards (Forest Plan, Social and Economic Environment, page 4-9) to the extent possible. Action alternatives are consistent with law, policy, regulation and the Forest Plan as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.13 Recreation

3.13.1 Analysis Indicators and Methodology

Field site visits were conducted during the summer of 2012, including visits to the Red Bank campground and to two of the four dispersed camp sites within the project boundary. The Recreation Opportunity Spectrum Field Guide (USDA Forest Service, 1990) emphasizes the general direction for recreation management including recreation site management, hazard reduction and vegetation management (Forest Plan, page 4-38). It provides a framework for understanding how management decisions may affect the recreation experience of the forest visitor, and the degree to which certain types of management are compatible with Recreational Opportunity Spectrum classes. Each class has limits of acceptable change within the following seven setting indicators: Access, Remoteness, Naturalness, Facilities, Social Encounters, Visitor Impacts and Visitor Management; these determine the levels of management that are either *Fully Compatible*, *Normal*, *Incompatible*, or *Unacceptable* within that class. When analyzing vegetation and fuels projects, the *Naturalness* setting indicator is used to determine the amount of perceptible disturbance that is consistent with the Recreational Opportunity Spectrum class.

The 2008 Forest Recreation Facility Analysis and Forest Recreation Settings Map are used to determine the Recreation Setting specific to a part of the Forest. Different settings represent different priorities and functions of an area, and are used to analyze the consistency of actions with maintenance of the visitor experience and protection of resources.

Analysis Indicators

- Amount of perceptible disturbance to *Naturalness* of views from recreational sites.
- Consistency with maintaining access to the recreational use.

3.13.2 Spatial and Temporal Context

The project area is the spatial context for the analysis of recreational opportunities. Recreational sites within one mile of a treatment unit are expected to be affected by project actions. The effects can be short-term (less than one year) or long-term (up to ten years).

3.13.3 Affected Environment

There are four dispersed campsites and one concentrated use area, the Blue Ridge Lookout, within the project area as well as the Red Bank campground. More information on these sites is available in the Recreation Resource Report, available on the project website.

The recreation sites within one mile of proposed treatment areas are within the Rural Recreational Opportunity Spectrum class with the exception of fewer than 40 acres of proposed roadside fuels treatment. The Rural class includes recreation settings with visual evidence of management processes (Forest Plan, page 4-34).

The Jess project area is within the “Salmon River Country” Forest Area Setting. Key activities in this setting include whitewater rafting and kayaking on the Salmon River, hiking and equestrian travel, and hunting and fishing. The dispersed sites within this project area are most likely used as hunting camps due to their locations and road access. Three of the sites lack other specific attractions nearby but the site near Mud Lake (54DO17) has the added benefit of a scenic meadow and lake.

The Blue Ridge Lookout, constructed by the Civilian Conservation Corps in 1934, is considered a concentrated use site. It is visited for its panoramic views of the Salmon River drainages. The lookout itself is not accessible to visitors since the first flight of stairs has been removed.

3.13.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

There will be no direct or indirect effects to the recreation resources in the Jess project area with this alternative because no project actions will be implemented. There will be no changes made to the recreation sites, concentrated use site or the affected area in general.

Cumulative Effects

There are no direct or indirect effects to the visual quality of recreational sites or access to recreational sites in Alternative 1. Therefore, there are no cumulative effects.

Alternatives 2 and 3

Direct and Indirect Effects

Effects of alternatives 2 and 3 are discussed together because the effects of these alternatives on recreation are similar.

The proposed vegetation and fuels treatments in the project area have the potential to have positive and negative effects on the recreation resources, namely the four dispersed sites and the Blue Ridge Lookout. Although the Red Bank campground is within the project area, it is not within the vicinity of the proposed treatment areas so effects to the *Naturalness* of views from this campground are not analyzed. The effects of activities such as skid roads, landings, slash, stumps, etc. on the landscape are analyzed to see if they maintain the characteristics of the Recreational Opportunity Spectrum class. One

aspect of this is whether vegetation is left, when possible, to provide visual screening around dispersed campsites so that visitors are able to feel secluded from other people and activities. No action is proposed in the immediate vicinity of the Blue Ridge lookout so there will be no effect on *Naturalness*. Scenic impacts are discussed further in the Scenery section of this document and the Scenery Resource Report, available on the project website.

Direct effects of action alternatives include effects of logging operations and fuels treatments that take place during typical recreation peak months of July – October. Public access may be hindered byroads that are closed during active thinning, and any haul routes on Forest system roads may be avoided by the public as well. If skid trails are located near any dispersed sites there will be potential for those activities to disrupt a recreation opportunity. Burning will likely occur outside of the peak recreational season (June through September) so it is unlikely that burning activities will have an impact on the recreation opportunities in the area. Notices of burning will be issued (see Table 5) to allow recreationists to avoid areas potentially impacted by smoke.

Indirect effects include potential long-term visual impacts to the area, particularly evidence of log landings, skid trails and slash piles that may be within view from recreation sites. Reduction of good screening-vegetation around sites will reduce the recreation opportunities in the area. Hazard trees, as identified in the Region 5 Hazard Tree Guidelines, around dispersed sites are removed as part of the normal Forest program of work but any additional potential hazard tree removal in the area will make for a safer recreation setting further into the future than simply following the Regional guidelines and removing the most imminent hazards. Drivers on the Salmon River road who are viewing scenery may experience increased log truck traffic during any hauling.

Recreation project design features 1-3 (section 2.2.4) serve to mitigate the direct and indirect negative impacts of this project by maintaining non-hazardous vegetation around dispersed sites and locating skid trails and landings away from them.

This project will have no effect on hikers, equestrians or boaters who are in the area to use recreational trails or waterways because there is no proposed activity near any trails, trailheads or river access points.

Cumulative Effects

The cumulative effects of action alternatives plus the effects of the adjacent Eddy Gulch Late Successional Reserve Habitat Restoration project and other projects in the area will be minor. Due to the historic low levels of dispersed recreation use on the Forest, it is unlikely that there will be inadequate access to recreation opportunities in the Salmon River area. In other words, anyone who may be displaced by the Jess project, the Eddy Gulch project and other projects can easily find recreational opportunities close by.

3.13.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Action alternatives comply with law, policy, regulation and the Forest Plan. Applicable Forest Plan Forest-wide Standards and Guidelines will be met by the Jess project as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.14 Scenery

3.14.1 Analysis Indicators and Methodology

This evaluation applies current National Forest Landscape Management methodology in conjunction with existing Forest Plan direction on scenery. It relies heavily on previous field studies of similar types of projects, as well as field observations from sensitive viewpoints and consideration of public preferences for scenic quality. The general process for a scenery evaluation follows:

- Determine high or moderate sensitivity viewpoints located within or adjacent to the project area from which the project may be visible. These are identified in an inventory maintained in the Forest Supervisor's office.
- Review project descriptions and maps; assessing project activity locations (orientation, slope position, distance from viewer, etc.), logging systems, combined with on-the-ground knowledge of topography and vegetation.
- Conduct field reviews conducted of critical units proposed in this project, focusing on project activities located in Partial Retention Visual Quality Objectives areas.
- Evaluate individual project activities for their visibility from high or moderate sensitivity routes. Evaluate noticeable changes from project activities to existing landforms and vegetation in terms of form, line, color, and texture contrasts. Using professional expertise, compare the overall visual dominance and degree of noticeable contrast to the existing scenic character against the Visual Quality Objectives which define levels of acceptable visual change.

Analysis Indicators

- Consistency with Visual Quality Objectives.
- Visual impacts to Wild and Scenic River designation.

3.14.2 Spatial and Temporal Context

The spatial analysis boundaries for visual resource management (scenery) include the viewsheds from sensitive viewing locations as required by the Forest Plan (Forest-wide Standard 11-1, page 4-35). Temporal bounding is three years for short-term effects, at which time projects are required to meet their assigned Visual Quality Objectives, as required by the Forest Plan's Standards and Guidelines. Long term effects are ten years or longer.

3.14.3 Affected Environment

The project area is either within the Partial Retention Visual Quality Objective, in which management activities may be noticeable but are subordinate to the characteristic landscape, or within the Modification Visual Quality Objective in which management activities may dominate but reflect natural features. "Viewing Natural Features" and "Viewing Wildlife" are, respectively, the second and third most popular recreation activities of visitors to the Forest, and scenic quality of the project area is important to those activities.

In terms of Scenic Character (the overall visual impression or image that gives a geographical area its identity) the North Fork Salmon River drainage, including the

project area, is isolated, vast, and rugged with lush forest vegetation and beautiful rushing mountain streams with unbelievably clear, cold water. Eddy, Jessups, Glasgow, and Jones Gulches and Shiltos Creek are flanked by mid-elevation, very steep, rugged mountainous terrain which is bisected by numerous smaller side drainages. There are numerous breaks in the forest canopy from previous wildfires, older harvest units, roads, rock outcrops, and meadows. In the background, more open higher elevation ridges and peaks provide a visual backdrop. Vegetation is diverse in both pattern and species as described in section 3.1.3 and in the Scenery Resource Report. Dense vegetation not only obstructs in-canopy views to the forest floor but also provides ladder fuels for wildfires (as discussed in section 3.2.3) and increased tree mortality when combined with epidemic levels of insect and disease infestation (section 3.1.3); both of these can be adverse to valued landscape character attributes. Streams display extremely high water clarity and air quality is high, with coastal moisture occasionally adding clouds and haze to the typical clear views under bright blue skies.

In terms of scenic character expectations of current user groups (sense of place) both the very low population density and the distance from larger human population centers contribute to an independent, rural residential lifestyle as described in section 3.11.3.

Scenic integrity (the relative degree of natural appearance displayed by a landscape) in the project area is characterized by limited evidence of existing roads, fire breaks, plantations, and past logging units. Across the project area as a whole, alterations are minor and generally a near-natural appearance dominates. Vegetation and/or topography screen most of these management activities except when in the immediate vicinity of the activity. Therefore, the project area has Moderate Scenic Integrity and meets a Partial Retention Visual Quality Objective.

Table 19 represents a list of all the *potential* viewpoints located in or near the project area, their visual sensitivity, and the viewer position from which project activities from will be visible. The visual assessment of project activities uses these viewpoints. Sensitive viewpoints include the community of Sawyers Bar, a Wild and Scenic River, one Forest highway, a fire lookout, and a dispersed camping area.

Table 19. Potential viewsheds, visual sensitivity levels, and viewer position.

Potential Viewpoint(s)	Visual Sensitivity Level	Viewer Position
Sawyers Bar	High	Inferior
North Fork Salmon River (Wild & Scenic River)	Moderate	Inferior
Forest Highway 102 (North Fork Salmon River Road)	Moderate	Inferior
Blue Ridge Lookout	Moderate	Superior
Red Bank Campground	Moderate	Inferior

Cow Ridge Trail	Moderate	Superior
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Along streams, lakes, meadows, and high elevation ridges, the scenic attractiveness of the landscape is Distinctive – A; on the mid-slopes, scenic attractiveness is Common - B.

Wild and Scenic River: The North Fork Salmon River is a segment of the Klamath Wild and Scenic River which was designated in 1981 to protect and enhance its free-flowing condition, water quality and fishery values. The Wild and Scenic River Act and Forest Plan (pages 4-120 through 4-122) also include protection requirements for the river’s aesthetic, scenic, historic, archaeological and scientific features. The North Fork Salmon River has a “recreational” Wild and Scenic River classification to accommodate the river’s accessibility by roads and inclusion of some development along its shoreline.

3.14.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under this alternative, current management plans will continue to guide management of the project area. There will be no commercial or noncommercial vegetation treatment, no roadside treatments, and no fuels treatment (such as hand piling, mastication, and underburning) and no meadow enhancement. The noticeability of existing disturbances will gradually decrease over time through natural vegetative recovery (growth) and screening but may be disturbed again by unforeseen future disturbances such as wildfire. Increased tree mortality due to epidemic levels of insect and disease will lead to long-term decreases in the number of large trees (see discussion in section 3.1.4). There will be no substantial effects to the Visual Quality Objectives in the short term.

The Recreation and Scenic Integrity conditions will preserve the Recreational River in a free-flowing condition. The river’s water quality and fisheries values are in good condition and will not be affected.

Cumulative Effects

Adding the minor effects of alternative 1 to the effects of ongoing and reasonably foreseeable future actions will result in minor cumulative effects. Past management actions have been incorporated into the affected environment and their effects accounted for there. The project area will continue to meet Partial Retention Visual Quality Objectives.

Alternative 2

Direct and Indirect Effects

The short-term visual impacts from underburning will create brown vegetation, red tree crowns, blackened duff layer, scorched trunks, and minor disturbance from fuel break construction. Recovery times of three years will allow revegetation or “greening up” of many of the burn effects. At that point, any residual effects from the underburn will appear as a natural occurrence, consistent with the many wildfires that have occurred throughout this area. Underburning will create long-term positive effects such as the creation of more open stands where forest visitors can look into stands, larger trees and wildlife and greater species diversity can be seen, and stands will have increased

resiliency to wildfire. The Partial Retention Visual Quality Objective will be met; this alternative will help move the project area toward meeting the Forest-wide standard to perpetuate the Forest's ecologically established landscape character (Forest Plan standard 11-4, page 4-35).

The proposed commercial and non-commercial treatments will create more open stands of varying densities with some small openings and some un-thinned areas in small patches, and enhance the growth of hardwoods. These treatments will create long-term positive effects where forest visitors can look into more open stands, observe larger trees (where present after treatments reduce insect and disease-related tree mortality), and see greater species diversity and spatial variety.

It is probable that many of the commercial units will be visible from Cow Creek trail at a background distance zone (less than four miles). These units will mimic other more open stands found in the area, will appear near-natural in the long term and meet a Partial Retention Visual Quality Objective.

Thinning of small diameter conifers in the ridgetop fuels treatments will reduce ladder fuels, encourage large tree growth, increase fire resiliency and visually "open up" the ridgetops, appearing as a natural occurrence by mimicking similar ridges in the characteristic landscape. It is probable some of these treatments will also be visible from isolated locations in Sawyers Bar.

Because a masticator grinds and chops up small diameter trees and brush in place, leaving behind crushed vegetation (limbs, brush, trees) which partially cover bare soil, masticated areas will appear lighter in color and more open in the short term; this increases textural contrasts with adjacent trees or brush. It is probable that some of the masticated areas will be visible from Cow Creek trail and Blue Ridge lookout. However, a recovery time for Partial Retention Visual Quality Objective of three years will allow revegetation or "greening up" so long-term effects are at acceptable levels. The visual changes in color and texture will appear near-natural occurrences within three years.

Removal of small diameter conifers and brush along roads will also open up visibility into the forest. Some of these treatments will be visible to visitors traveling to Blue Ridge lookout. Three years of revegetation or "greening up" will reduce color and texture changes, and minimize visibility of stumps, so that long-term effects are at acceptable levels. The treatments will be near-natural appearing occurrences within three years and easily meet their assigned Visual Quality Objective of Partial Retention or Modification.

Since meadow enhancement involves the removal of small encroaching conifers and planting of willows as needed, this activity will restore the meadow to more natural conditions and perpetuate the Forest's ecologically established landscape character (Forest Plan Standard 11-4, page 4-35). Project activities will be natural or near-natural appearing and meet the Partial Retention Visual Quality Objective. Meadow restoration will create positive long-term scenery effects by eliminating conifer encroachment and maintaining high scenic quality. This activity will not be visible from any sensitivity viewpoint.

Field review determined that because of topographic and/or vegetative screening, no project activities will be visible from three sensitivity viewpoints – North Fork Salmon

River Road, the North Fork Salmon River, and Red Bank campground. Consequently there will be no effect to these viewpoints.

The project's vegetation enhancement treatments will reverse adverse ecosystem trends and support all Wild and Scenic River values. The river's free-flowing condition will be protected, while water quality and fisheries values will be enhanced through the project's many short- and long-term ecosystem diversity improvements. The current risk of adverse and uncharacteristic wildfire and erosion impacts due to impaired ecosystem conditions will be reduced. Wild and Scenic River recreation settings and scenic integrity will be enhanced immediately after project completion and for several decades thereafter through creation of more attractive vegetation conditions that are resilient to large scale disturbance. The project's Wild and Scenic River effects will be fully consistent with all applicable Forest Plan Wild and Scenic River direction.

Cumulative Effects

The effects from past vegetative alterations in the project area have slightly diminished scenic quality over the years. The Glassups project underburn and the Eddy Gulch Late Successional Reserve Habitat Restoration project are anticipated to meet Visual Quality Objectives. Some of the past, present and reasonably foreseeable activities have revegetated (or are partially visible or invisible) because of topographic and/or vegetative screening from sensitive viewpoints. Adding the effects of this alternative to the effects of past, ongoing and reasonably foreseeable future actions, when viewed from multiple viewpoints, will be natural or near-natural appearing and cumulatively appear visually subordinate to the characteristic landscape. All viewsheds will meet the Partial Retention Visual Quality Objective.

Alternative 3

Direct and Indirect Effects

A reduction from alternative 2 of approximately 400 acres of total treatments will create fewer acres of positive scenery effects from more open stands, observing larger trees (where present), seeing greater species diversity and spatial variety, and increased resiliency to wildfire. Indirect effects will be fewer opportunities for wildlife viewing.

Cumulative Effects

All of the cumulative scenery effects are the same as alternative 2.

3.14.5 Compliance with Law, Policy, Regulation, and the Forest Plan

All alternatives are in compliance with law, policy and regulation including the Wild and Scenic Rivers Act. Action alternatives will help achieve the Forest-wide standard (Forest Plan, 11-4, page 4-35) to perpetuate ecologically established scenery, minimize visible disturbances (meet Forest Visual Quality Objectives), and maintain scenic opportunities.

3.15 Cultural Resources

3.15.1 Analysis Indicators and Methodology

The Forest is required to take into account the effects of all Forest undertakings on historic properties pursuant to Section 106 of the National Historic Preservation Act and the Programmatic Agreement among the USDA, Forest Service, Pacific Southwest

Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region (Regional PA). The following summarizes the effects of implementation of the Jess project on historic properties located within the project.

The methodology employed for this analysis is primarily guided by two parameters. The first is determining the area within which implementation of an alternative has the potential to have an effect. The second is establishing whether or not there are historic properties present within this area which may be affected by project implementation.

Establishing the area within which there was potential to have an effect resulted in the development of the Area of Potential Effect. The Area of Potential Effect was developed primarily based upon the actions associated with proposed alternatives. The Area of Potential Effect was also used to guide efforts associated with historic property identification.

Identification of historic properties within the Area of Potential Effect forms the second component of analysis. This effort involved three elements: pre-field research, field surveys, and consultation. Pre-field research involved a thorough review of existing and available information on known historic properties within the Area of Potential Effect. Field surveys were conducted within the Area of Potential Effect to locate and identify any previously unknown historic properties. Consultation efforts included soliciting information on historic properties from tribal organizations, the general public, and within the forest service.

Analysis Indicators

Impacts are assessed using criteria defined by regulations for Protection of Historic Properties (36 CFR Part 800). If an action could change in any way the characteristics that qualify the resource for inclusion on the National Register of Historic Places, it is considered to have an effect. An effect is a direct or indirect alteration of the characteristics of an historic property that qualifies it for inclusion in the National Register of Historic Places.

Effects to historic properties are classed into four categories based upon relative intensity:

- Negligible: The effect on archaeological sites would be at the lowest levels of detection—barely measurable with any perceptible consequences.
- Minor: The effect on archaeological sites would be measurable or perceptible, but it would be slight and localized within a relatively small area for a site or group of sites.
- Moderate: The effect would be measurable and perceptible. The action would change one or more character-defining features of a resource, but it would not diminish the integrity of the resource to the extent that its National Register of Historic Places eligibility would be jeopardized.
- Major: The effect on archaeological sites would be substantial, noticeable, and permanent. For National Register of Historic Places eligible or listed archaeological sites, the action would change one or more character defining

features of an archaeological resource, diminishing the integrity of the resource to the extent that it no longer would be eligible for listing in the National Register of Historic Places.

3.15.2 Spatial and Temporal Context

The spatial bounding of the analysis area for the Jess project is the Area of Potential Effect. The Area of Potential Effect is defined as any area within the project in which activities are proposed to occur, as well as areas utilized in support of those activities. The Area of Potential Effect differs from the more general project area in that it specifically refers to localized areas in which project-related activities are proposed. The Area of Potential Effect is used for effects analysis rather than the project area because archaeological sites are static resources. Because these resources are present at fixed locations, an action has to occur at or near that location to cause an effect. Thus, the Area of Potential Effect refines the analysis to only areas which are identified for actions to eliminate extraneous analysis.

Temporal bounding of this analysis is composed of two effects classifications: short and long term. Short-term effects are those which occur during or up to the first five years following implementation. Long-term effects are those which occur after the five year period following implementation. Effects are classified as short and long term in order to distinguish between those effects most immediately associated with project implementation relative to effects considered for indefinite resource management purposes.

3.15.3 Affected Environment

The Jess project is located within an area known to have both prehistoric and historic archaeological sites. Two prehistoric sites and eight historic sites have been identified within the Area of Potential Effect. Archaeological sites are irreplaceable resources; damage or destruction of sites is permanent and irreversible.

No traditional cultural properties, traditional or contemporary use areas, or specific areas of spiritual significance have been identified within the Area of Potential Effect of this project.

3.15.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

There will be no measureable direct or indirect effects to archaeological sites from alternative 1 because no management actions will be taken. Therefore, implementation of this alternative will not result in direct or indirect adverse effects to sites.

Cumulative Effects

Since implementation of this alternative will not result in either direct or indirect effects, there are no cumulative effects.

Alternative 2

Direct and Indirect Effects

Implementation of alternative 2 involves taking actions which have the potential to effect archaeological sites. However, employing Standard project design features during implementation will not result in any direct effects to historic properties. Project design features used for this undertaking include the physical demarcation and avoidance of all historic properties during implementation (section 2.2.4).

Indirect effects of implementing alternative 2 may result even with the application of project design features. Use of project design features to mitigate direct effects to sites may promote conditions where indirect effects are more likely to occur. The increase in potential for indirect effects stems from increasing the visibility of sites in areas avoided by project activities, and leaving a higher vegetative fuel loading within sites as compared to surrounding areas.

An increase in site visibility in turn increases the likelihood that sites will be subjected to looting and vandalism. The effects from these types of impacts are difficult to predictively analyze since they are specific to an individual site and situation. They are also difficult to anticipate because it is not known where or when they might occur, or to what extent. Potential indirect effects from looting/vandalism may range from negligible to major through the short and long term.

Leaving a higher fuel loading within a site increases the risk that the site will burn more intensely during a wildfire than does the surrounding area. Intense fire may damage or destroy combustible artifacts or permanently alter materials susceptible to heat or flame within a site. The effects from fire are difficult to predictively analyze since they are specific to an individual site, fire behavior, and fuel conditions. Fire effects are also difficult to anticipate because it is not known where, when, or under what conditions they might occur. Potential indirect effects from wildfire may range from negligible to major through the short and long term.

Implementation of alternative 2 will not necessarily result in the indirect effects described above. However, it may increase the potential for these effects to occur by creating conditions which give rise to a higher probability of such effects occurring.

Cumulative Effects

Because effects to archaeological sites are location specific, implementation of past, present, and reasonably foreseeable future actions associated with other projects will not result in a cumulative effect to sites within the Area of Potential Effect for the Jess project, unless those actions occur within site boundaries. At this time, there are no present or upcoming actions proposed within the boundaries of sites in the Jess Area of Potential Effect. Therefore, implementation of alternative 2 will not have a cumulative effect on archaeological sites within the Area of Potential Effect.

Alternative 3

Direct and Indirect Effects

Implementation of alternative 3 would result in similar direct and indirect effects as those described for alternative 2. Project design features will be employed to avoid direct effects to sites; a higher probability for indirect effects associated with an increase in site visibility and leaving higher fuel loading within sites may result.

Cumulative Effects

Cumulative effects of implementing alternative 3 are similar to those discussed for alternative 2.

Comparison of Effects

Implementation of alternative 1 will result in no direct, indirect, or cumulative effects to archaeological sites within the Area of Potential Effect. Implementation of alternative 2 or 3 will not result in any direct or cumulative effects to sites but may result in an increased potential for indirect effects over the short and long term. Because implementation of alternative 2 or 3 only increases the potential for these effects, the nature and extent of such effects cannot be effectively analyzed or predicted. Therefore, indirect effects from alternatives 2 and 3 are not fully understood as these effects, if they were to occur at all, will result from unanticipated or uncontrolled events occurring independently of management decisions.

3.15.5 Compliance with law, policy, regulation and the Forest Plan

Regardless of the alternative selected, historic properties identified within the project area will be managed in accordance with the guidelines set forth in the *Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region* (Regional PA). Management of historic properties according to the provisions set forth in the Regional PA is consistent with Forest Plan direction, as displayed in the Forest Plan Consistency Checklist, and is in compliance with the National Historic Preservation Act. Therefore, implementation of the project is consistent with Forest Plan direction and in compliance with law, regulation, and policy.

3.16 Climate Change

Increasing the relationships between human-caused emissions, climate change, and the role of the forests as carbon sinks are being documented (Intergovernmental Panel on Climate Change 2007). Although uncertainty exists in quantifying the impact of emissions on climate, a global warming of 1.4 to 5.8 degrees centigrade is projected by 2100 (Intergovernmental Panel on Climate Change 2007). Adapting to climate change and its potential impacts poses challenges and opportunities of managing resources. Forests and rangelands are seen as part of the solution to reducing atmospheric carbon dioxide and other greenhouse gases. However, the magnitude of the opportunity for carbon storage is not well quantified or thoroughly understood.

The use of future climate scenarios and ecological models suggests that the impact of climate change on ecosystems in the United States may include increases in ecosystem

productivity in the short term and shifts in the distribution of plants and animals in the long term (Joyce and Birdsey 2000). As climate changes advance, there are some indications that there will be increases in disturbances such as wildfires, drought, and insects (Intergovernmental Panel on Climate Change 2007). Based on the relevant science, it is still speculative to factor any specific ecological trends or substantial changes in climate into the analysis of environment impacts of individual projects. For example, changes in wildlife ranges and habitat in forested environments due to climate change are not well understood. Therefore, such issues are outside the scope of this project. Currently, the relevant science concerning climate change is not adequate to support reliable predictions about ecological interactions and trends at the local project level.

In general, based on predictions of a warming climate and increases in disturbances such as wildfire and insect infestations, it is expected that treatments proposed in the action alternatives for this project will benefit forests through thinning and fuel-reduction treatments designed to reduce stress on remaining trees, increase growth, promote species diversity, favor fire-resistant tree species, and reduce risk of loss due to insect and disease epidemic infestations. The contribution of this project to factors that may affect climate change such as greenhouse gas emissions is disclosed in section 3.8.

Managing forests for carbon sequestration is a poorly understood science but active forest management is believed to be an effective method of carbon sequestration (Intergovernmental Panel on Climate Change 2007). Thinning and fuel-reduction treatments will not eliminate wildfire from the project area but can help change how wildfire can be controlled (as discussed in section 3.2.4 and the Fuels and Fire Resource Report, available on the project website), thereby likely reducing carbon dioxide emissions resulting from wildfire.

3.17 Short-term Uses and Long-term Productivity

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Short-term uses and their effects are those that occur within the first few years of project implementation as discussed in resource sections of this chapter. Long-term productivity refers to the capability of the land and resource to continue producing goods and services long after the project has been implemented. Under the Multiple-Use Sustained-Yield Act, and the National Forest Management Act, all renewable resources are to be managed in such a way that they are available for future generations. Harvesting trees by thinning, and use of the timber that results from the thinning, can be considered a short-term use of a renewable resource. As a renewable resource, trees can be maintained and continue to grow on the project area if the long-term productivity of the land is maintained. This long-term productivity is maintained through the application of the design features

described in section 2.2.4, especially those applying to the soil, water, and geology resources (Watershed).

Harvesting trees through thinning in the action alternatives will reduce stocking levels (Trees per Acre and Stand Density Index), leading to reductions in density-related mortality including those from some types of insect and disease infestations. The resulting stand conditions will be more sustainable over the long term from the standpoints of vegetative diversity and ecological processes. Treatments in the action alternatives are expected to promote the development of healthier stands with endemic dwarf mistletoe infection rates rather than if left untreated as described in section 3.1.4 and the Silviculture Resource Report.

All action alternatives will experience a period of increased fire hazard due to a potential for increases in brush as a result of the silvicultural prescriptions as described in section 3.2.4. The degree of brush response is variable, depending on the existence of a seed bank, the amount of canopy removed, and the location of the treatments. The response will be evaluated and additional fuels treatments will be implemented to break up fuel continuity and brush concentrations as needed. All action alternatives will improve the chances of successful direct attack during suppression of a wildfire. The ridgetop and roadside treatments will improve the effectiveness and safety of fighting fires. The action alternatives will improve the defensibility of the community of Sawyers Bar and the municipal watershed against wildfire.

In the action alternatives, hydrologic stabilization of temporary roads on existing roadbed may cause short-term risks to water quality from displaced soils but these risks will be minimized by application of design features in section 2.2.4. In the long-term, closing temporary roads after use and hydrologic stabilization will avoid impacts of erosion and sedimentation as described in the Soils and Hydrology sections of this chapter.

All action alternatives will degrade or remove foraging habitat used by northern spotted owl by a small amount in the short term, but this is offset by reducing the density of vegetation and improving stand health and ecological processes in the long term as described in section 3.3. Long-term beneficial effects will occur as desired tree species and currently mid-sized trees grow. Alterations in scenery will be slightly noticeable in the short term in all action alternatives but these will be minimized by the application of design features described in section 2.2.4. In the long term, the scenery mosaic will have a substantially greater likelihood of being perpetuated by action alternatives than with taking no action.

3.18 Unavoidable Adverse Effects

Implementation of any action alternative may cause some adverse environmental effects that cannot be effectively mitigated or avoided by design features. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Some adverse effects are short-term and necessary to achieve long-term beneficial effects. In the case of this project, some negative effects from implementing the proposed treatments are necessary to obtain the benefits of restoration of ecological processes (dwarf mistletoe infection rates) and improving defensibility of the community of Sawyers Bar. Many adverse effects can be reduced, mitigated, or avoided by limiting the extent or duration of effects. The interdisciplinary

process used to identify specific commercial and non-commercial thinning stands as well as fuels treatments was designed to eliminate or lessen adverse consequences (to one or more resource at the expense of other resources). Applying specific design features from Table 5, and following standards and guidelines from the Forest Plan including implementation of Best Management Practices, further limit the extent, severity and duration of potential adverse effects. Regardless of the use of these measures, some adverse effects will occur under all alternatives (including no action) as described in the “Short-term Uses and Long-term Productivity” section of this chapter. Full descriptions of the effects of implementing alternatives can be found in the resource sections of this chapter.

3.19 Irreversible and Irretrievable Commitments of Resources ____

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. No irreversible commitments of resources are identified for this project.

Irretrievable commitments are those that are lost for a period of time such as use of renewable resources. The temporary loss will be irretrievable but the action will not be irreversible. Under alternative 1, there will be an irretrievable loss of forest vegetation as the dwarf mistletoe infection rate climbs (section 3.1.4). Under action alternatives, risk of loss of forest vegetation to epidemic infection rates of dwarf mistletoe will be reduced but not eliminated. Vegetation removed as a byproduct of restoration thinning and fuels reduction treatments will constitute loss of individual trees that are harvested but this will not result in loss of productivity of entire stands of vegetation. Functioning of forest habitats will continue and conditions are expected to improve (achieve late-successional conditions sooner) within several decades. Effects are in accordance with the goals of restoration of ecological processes, defensibility against wildfire and rural community health as described in the purpose and need for the project and disclosed in sections 3.1, 3.2, 3.3, 3.11 and 3.12.

3.20 Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ...other environmental review laws and executive orders.”

3.20.1 Clean Water Act

The Clean Water Act, as amended, regulates the dredging and filling of freshwater and coastal wetlands. Section 404 (33 USC 1344) of the Clean Water Act prohibits the discharge of dredged or fill material into waters (including wetlands) of the United States without first obtaining a permit from the U.S. Army Corps of Engineers. Wetlands are regulated in accordance with federal Non-Tidal Wetlands Regulations (Section 40). No dredging or filling is proposed as part of any action alternative considered under this project, and no permits are required. This project complies with the Clean Water Act, including the Total Maximum Daily Loads for the Salmon River which are amendments to the North Coast Region Water Quality Control Board’s Basin Plan and are part of the California Water Code.

3.20.2 Clean Air Act

The Clean Air Act of 1970, as amended, provides for the protection and enhancement of the nation’s air resources. No exceeding of federal or state ambient air quality standards is expected to result from any action alternative considered in this project, as disclosed in section 3.8.

3.20.3 Environmental Justice (Executive Order 12898)

Based on the analysis of environmental effects in resource sections of this chapter, the action alternatives will have no adverse effects on human health or the environment that will disproportionately affect any group. As discussed in section 3.11, Siskiyou County has a disproportionate number of low-income residents and a slightly larger percentage of Native Americans than the State of California. Therefore, the job creation associated with action alternatives discussed in sections 3.11 and 3.12 will be beneficial to low-income people who are seeking jobs.

3.20.4 Non-native Invasive Species (Executive Order 13112)

This executive order directs federal agencies to prevent the introduction of invasive species; detect and respond rapidly to and control such species; not authorize, fund, or carry out actions that the agency believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and take all feasible and prudent measures to minimize risk of harm in conjunction with the actions. Project design features minimize the environmental effects of action alternatives, as disclosed in section 3.6, and meet the requirements of this executive order.

3.20.5 National Historic Preservation Act of 1966

The effects of this project on historic preservation are disclosed in the Cultural Resources section of this chapter. Application of design features identified in Table 5 will minimize or avoid the effects of action alternatives on cultural resources, both historic and

prehistoric. No known properties eligible for the National Register of Historic Places will be affected by action alternatives. Consultation with the State Historic Preservation Office for the State of California is ongoing as discussed in section 3.15.

3.20.6 Wild and Scenic Rivers Act

The effects of this project on wild and scenic rivers are disclosed in section 3.14. Action alternatives will not adversely affect the North Fork Salmon River section of the Klamath Wild and Scenic River (designated as Recreational in the potentially affected sections).

3.20.7 Endangered Species Act

Compliance with the Endangered Species Act is disclosed in sections 3.3, 3.4 and 3.5, and in referenced Biological Assessments. Consultation with the National Fisheries Marine Service for fisheries has been completed and a Letter of Concurrence on the effects of the Jess project received on April 1, 2014. Consultation with the U.S. Department of Interior Fish and Wildlife Service for wildlife species is ongoing as discussed in section 3.3.

3.20.8 Energy Requirements, Conservation Potential, Depletable Resource Requirements

Consumption of fossil fuels will occur with the action alternatives during logging and hauling trees that have been cut, and during the hydrologic stabilization of temporary roads on existing roadbeds. No unusual energy requirements are included in action alternatives nor do opportunities exist to conserve energy at a large scale. Application of standards and guidelines from the Forest Plan for soils, and of design features identified in section 2.2.4, will conserve soil productivity. Supporting information can be found in the Soils Resource Report, incorporated by reference and available on the project website. The project is consistent with the Northern Spotted Owl Recovery Plan as disclosed in section 3.3 and the draft Wildlife Biological Assessment.

3.20.9 Prime Farmland, Rangeland, and Forest Land

The project area does not contain any prime farmland or rangeland. Prime forest land does not apply within the National Forest System lands.

3.20.10 Possible Conflicts with Other Land Use Plans

The action alternatives are entirely on National Forest System lands. The action alternatives are not in conflict with planning objectives for Siskiyou County or local Indian tribes as discussed in sections 3.11 and 3.15 and in referenced resource reports.

3.20.11 Incomplete or Unavailable Information

Applicable scientific information is discussed in the resource sections of this chapter and related resource reports. The unavailability of definitive scientific information is discussed in the “Climate Change” section of this chapter. Incomplete or unavailable information will not influence the disclosure of effects on other resources in this project.

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Chapter 4. Consultation and Coordination

4.1 Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of the Jess draft environmental impact statement.

4.1.1 Interdisciplinary Team Members

Patricia A. Grantham, Forest Supervisor; responsible official for decision; Klamath National Forest

Dave Hays, previous Salmon/Scott River District Ranger; responsible for managerial leadership; Klamath National Forest

Angie Bell, Leader of interdisciplinary team and geologist; responsible for team leadership, for geology and air quality input; Geology and Air Quality Resource Reports, and environmental impact statement preparation, Klamath National Forest

Joseph Blanchard, Soil Scientist; responsible for soils input; Soils Resource Report; Klamath National Forest

Margaret Boland, NEPA specialist, responsible for document review, Northern California Resource Center

Danika Carlson, Botanist; responsible for botany and noxious weeds input; Botany and Non-native Invasive Species Resource Reports, Botany Biological Evaluation; Klamath National Forest

Jason Coats, Archeologist; responsible for cultural resources input; Cultural Resources Report; Klamath National Forest

Sam Cuenca, Wildlife Biologist; responsible for wildlife input and for the Wildlife Resource Report, Wildlife Biological Assessment and Biological Evaluation, Wildlife section of the Management Indicator Species Report; Klamath National Forest

Bill Jones, Silviculturist, responsible for silvicultural prescriptions and marking guidelines, formerly Region Office (Region 5), Northern California Resource Center.

Marissa Jones, Forester; responsible for economics and society and culture input, Economics and Society and Culture Reports; Klamath National Forest

Jeff Keiser, Roads Manager; responsible for engineering input, final coordination of project with roads; Klamath National Forest

Lauren McChesney, Environmental Coordinator, Klamath National Forest

Maija Meneks, Fisheries Biologist; responsible for aquatic resources input; Aquatic Resources Report, Fish Biological Assessment and Biological Evaluation, Fish section of the Management Indicator Species Report, Klamath National Forest

Thomas Shickle, Fuels Technician; responsible for fire and fuels input; Fire and Fuels Resource Report; Klamath National Forest

Robert Talley, Landscape Architect; responsible for scenery input; Scenery Resource Report; Northern California Resource Center

Carl Varak, Vegetation Management Officer, responsible for Silviculture Resource Report, Klamath National Forest.

Verna Yin, Hydrologist; responsible for water quality input; Water Quality Resource Report; Klamath National Forest

4.1.2 Reviewers

Chad Bell, Forest Wildlife Biologist; Klamath National Forest
Wendy Coats, Forest Environmental Coordinator; Klamath National Forest
Clint Isbell, Forest Fire Ecologist; Klamath National Forest
Bobbie Miller, Forest Fisheries Program Manager; Klamath National Forest

4.1.3 Consulted Federal, State, and Local Agencies and Governments

Marcia Armstrong, Siskiyou County Board of Supervisors
Laura Finley, USDI Fish and Wildlife Service, Yreka Field Office
Katherine Fitzgerald, USDI Fish and Wildlife Service, Yreka Field Office
Donald Flickinger, National Oceanic and Atmospheric Administration
James Munson, U.S. Environmental Protection Agency, Region IX
Thomas R. Williams, Northern California Regional Water Quality Control Board Staff

4.1.4 Consulted Tribal Chairs

Russell Attebery, Chair, Karuk Tribe of California
Harold Bennett, (Current) Chair, Quartz Valley Indian Reservation
Janice Crow, Chair, Shasta Indian Nation
Roy Hall, Jr., Chair, Shasta Tribe, Inc.
Aaron Peters, (Former) Chair, Quartz Valley Indian Reservation

4.1.5 Others

Kimberly Baker, Klamath Forest Alliance and Environmental Protection Information Center
Karuna Greenberg, Sawyers Bar Fire Safe Council and Salmon River Restoration Council
George Sexton, Klamath Siskiyou Wildlands Center
Richard Svlich, American Forest Resources Council

4.2 Distribution of the Environmental Impact Statement

This draft environmental impact statement has been distributed to individuals who specifically requested a copy of the document and has been posted on the Forest worldwide website. In addition, summaries or copies have been sent to cooperators and contributors, and to the following Federal agencies, federally recognized tribes, State and local governments, and organizations representing a wide range of views.

4.2.1 Federal, State, and Local Agencies

Advisory Council on Historic Preservation
Siskiyou County Board of Supervisors
Siskiyou County Fish and Game Commission
North Coast Region Water Quality Control Board
U.S. Army Engineer Division, South Pacific
U.S. Coast Guard
U.S. Navy

USDA APHIS PPD/EAD
USDA National Agriculture Library
USDA National Resources Conservation Service
U.S. DOE Office of NEPA Policy and Compliance
U.S. Environmental Protection Agency
USDI Office of Environmental Policy and Compliance
Western-Pacific Region Federal Aviation Administration
USDI Fish & Wildlife Service, Yreka Office
Environmental Protection Agency, Region 9
Federal Highway Administration
National Marine Fisheries Service, Arcata Office
State Historic Preservation Officer
California Department of Fish and Game

4.2.2 Tribes

Karuk Tribe of California
Quartz Valley Indian Reservation
Shasta Indian Nation
Shasta Tribe, Inc.

4.2.3 Organizations and Individuals

George Sexton, Klamath Siskiyou Wildlands Center
Kimberly Baker, Klamath Forest Alliance
Salmon River Restoration Council
Salmon River Fire Safe Council
Richard Svilich, American Forest Resources Council
Dick Artley, Interested Party

4.3 Acronyms, Glossary, Literature Cited, and Index

4.3.1 Acronyms

ACS	Aquatic Conservation Strategy
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DBH	diameter-at-breast-height
DEIS	draft environmental impact statement
EPA	U.S. Environmental Protection Agency
ERA	Equivalent Roaded Acres
ESA	Endangered Species Act
FSH	Forest Service Handbook
FSM	Forest Service Manual
GEO	geology model (mass-wasting)
GIS	geographic information system
HFRA	Healthy Forests Restoration Act of 2003
MIS	Management Indicator Species
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USLE	Universal Soil Loss Equation

4.3.2 Glossary

Anadromous Fish ~ Species of fish that are born in freshwater, move to the ocean to mature, and return to freshwater to reproduce

Aquatic ~ Living or growing in water

Aquatic Conservation Strategy~ A strategy “developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands”

Aquatic Conservation Strategy Objectives ~ Objectives that “define the context for the agency review and implementation of management activities. Complying with the Aquatic Conservation

Strategy objectives means that an agency must manage the riparian-dependent resources to maintain the existing condition or implement actions to restore conditions. The baseline from which to assess maintaining or restoring the condition is developed through a watershed analysis. Improvement relates to restoring biological and physical processes within their ranges of natural variability.”

Basal Area ~ The term used in forest management that defines the area of a given section of land that is occupied by the cross-section of tree trunks and stems at their base

Beneficial Uses ~ “Beneficial uses” of the waters of the state that may be protected against water quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic

enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves (from Section 13050(f) of California's Porter-Cologne Water Quality Control Act)

Best Management Practices ~ Measures certified by the State Water Quality Control Board and approved by the Environmental Protection Agency as effective means of reducing water quality impacts from non-point sources of pollution

Board Foot ~ A unit of measurement equal to an unfinished board one-foot square by one-inch thick

Canopy: Tree crowns in a stand

Capable Lands ~ Lands where at least 20 cubic feet of commercial wood products can be grown per acre per year

Chain ~ Unit of linear measure often used on public lands, particularly in measuring the rate of wildfire spread (chains per hour). One chain equals 66 feet

Coarse Woody Debris ~ Woody material at least 20-inches in diameter from whatever source that is dead and lying on the forest floor. Term used for terrestrial species habitat. See Large Woody Debris for aquatic species habitat

Commercial Thinning ~ any type of thinning producing merchantable material at least equal to the value of the direct costs of harvesting

Compacted Soils ~ Soils with reduced porosity

Critical Habitat ~ Defined in the Endangered Species Act as (1) the specific areas within the geographical area occupied by the species, at the time it is federally listed, on which are found those physical or biological features essential to the conservation of the species, and which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed, when it is determined by the Secretary of the Interior that such areas are essential for the conservation of the species

Cumulative Effects ~ Those effects resulting from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions

Cumulative Watershed Effects Model ~ A model for Cumulative Watershed Effects with three components: Equivalent Roded Acres (ERA), sediment delivery from surface erosion (USLE), and sediment delivery from mass wasting (GEO). The model quantifies disturbances and land sensitivity at the 7th field watershed scale and can calculate them at larger scales. The estimated results fall on a continuum. As disturbances increase over time and space, at some point the risk of initiating or contributing to existing adverse cumulative watershed impacts becomes a cause for concern. Concern thresholds have been identified for each component based on field observations in the Forest

Diameter Breast Height (dbh) ~ The diameter of a standing tree at a point 4½ feet above ground level, measured from the uphill side

Direct Attack ~ Any treatment applied directly to burning fuel such as wetting, smothering, or chemically quenching the fire or physically separating the burning from unburned fuel

Direct Effects ~ Those effects occurring at the same time and place as the initial cause or action

Dispersal ~ The relatively permanent movement of individual animals from one location to another. Usually dispersal is the movement of young animals from where they were born to a site where they eventually settle to breed

Dwarf Mistletoe (*Arceuthobium spp.*) ~ A host specific parasitic seed plant found in all the major conifer species (red fir, white fir, Douglas-fir and incense cedar)

Ecosystem ~ A dynamic community of biological organisms, including humans, and the physical environment with which they interact

Effects ~ Impacts; physical, biological, economic, and social results (or expected results) from implementing an activity

Embeddedness ~ Degree to which large streambed materials such as cobbles and gravel are surrounded or covered by fine sediment

Endangered Species ~ Any species that is in danger of extinction throughout all or a significant portion of its range

Environmental Justice: Executive Order 12898 requires an assessment of whether minorities or low-income populations would be disproportionately affected by proposed actions

Equivalent Road Acres (ERA) ~ An index of average watershed disturbance expressed in road equivalent acres relative to a “threshold of concern” assigned for the watershed.

Erosion: A general term for movement of soil particles on the surface of the land initiated by rainfall and running water. This includes surface erosion and channel erosion, as opposed to landsliding

Fire Behavior ~ The manner in which a fire reacts to fuels, weather, and topography

Fire Return Interval ~ Number of years between two successive fire events in a given area

Fire Risk ~ The statistical probability of a fire start occurring over a ten-year period for a given thousand-acre area

Fire Suppression ~ All work and activities associated with extinguishing a fire

Forest Plan ~ The Klamath National Forest Land and Resource Management Plan, approved in 1995. The Forest Plan provides land allocations, Standards and Guidelines, and direction for management of the Klamath National Forest

Fuel Loading ~ The quantity of fuel per acre in a given area

Fuel Treatment ~ The process of removing and/or modifying natural or human created fuels to reduce fire hazard and achieve other resource objectives

Fuels ~ Anything within the forest that will burn; usually live and dead woody vegetation

Ground-based Equipment ~ Equipment that runs on the ground, like tractors, rubber tired skidders, and masticators

Ground Fuels ~ Loose combustible material on the soil surface, consisting of fallen leaves, twigs, bark, and small branches, as well as grasses, small plants, seedlings trees, dead branches, and logs

Hawksworth Rating System ~ A system developed by Hawksworth in 1977 to rate severity of infection by dwarf mistletoe in a tree or stand. The rating system forms a basis for defining management implications and recommendations

Healthy Stand (for the Project Area) ~ Exhibits insect and disease levels such that mortality is not substantial (snag and coarse woody debris levels are within Forest standard and guidelines); endemic levels of forest pests and disease; the area maintains some structural components of older stands; trees per acre (stocking level) within the range that can be supported by the land; and conditions such that the area is defensible against wildfire with a direct firefighting techniques

Hydrologic ~ Dealing with the movement and properties of liquid water in environmental systems. Includes the circulation patterns of water in the biosphere from condensation and precipitation to movement both on and under the ground surface to evaporation back into the atmosphere

Impacts ~ Physical, biological, economic, and social results (or expected results) from implementing an activity

Incorporation by Reference ~ A technique used to cut down on the bulk in environmental documents without impeding agency and public review of the action. The material included as part of the document must be cited in the document and its content briefly described

Indirect Effects ~ Those effects occurring later in time or that are spatially removed from the activity

Inference Point ~ The midpoint of a zone where disturbances become great enough to cause concern about initiating or contributing to adverse cumulative watershed effects

Infiltration (soil) ~ The movement of water through the soil surface into the soil

Interdisciplinary ~ The utilization of individuals representing two or more areas of knowledge and skills focusing on the same subject

Irretrievable ~ An irretrievable commitment of resources entails a loss of production, harvest, or use of natural resources. Such decisions are reversible, but the production opportunities foregone are irretrievable (50 Federal Register 26082)

Irreversible ~ An irreversible commitment of resources entails a loss of future options. This applies primarily to the effects of use of non-renewable resources such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over a long period of time (50 Federal Register 26082)

Issue ~ Point of discussion, debate, or dispute about the environmental effects of the proposed action

America. It is caused by *Phellinus weirii*, a fungus, and affects mostly fir trees and cedars

Land Allocation ~ The assignment in the Forest Plan of a management emphasis to particular land areas with the purpose of achieving goals and objectives

Late-successional characteristics ~ Characteristics of a stand of trees indicative of maturity, including mature and over-mature trees in the overstory; multi-layered canopy with trees of several age classes; and standing dead trees and down material

Late-successional habitat ~ Older forested stands with moderate to high canopy closure; often containing a multilayered, multispecies canopy dominated by large overstory trees; large trees with broken tops or other indications of old and decaying wood; numerous large snags; and moderate to heavy accumulations of large logs on the ground

Late-successional reserves (LSR) ~ Large blocks of habitat that are distributed across the range of the northern spotted owl and spaced closely enough to facilitate dispersal of owls. Late-successional reserves are managed to provide habitat for late successional and “old growth” species

Management Area (MA) ~ A distinct geographical area with specified objectives and prescriptions

Management Direction ~ A statement of multiple use and other goals and objectives, along with the associated management prescriptions and Standards and Guidelines to direct resource management

Masticator ~ Equipment that grinds or chews up vegetative material

Matrix ~ Lands outside of reserves and withdrawn areas; lands assigned a regulated timber yield

Monitoring ~ Process of collecting information to evaluate if objective and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned

National Environmental Policy Act (NEPA) ~ The act that governs how federal agencies assess impacts of management actions on public lands. The process is interdisciplinary and requires consideration of the environmental effects of alternatives and disclosure of those effects

National Forest Transportation System Road ~ A classified Forest road under the jurisdiction of the Forest Service. The term “National Forest System Roads” is synonymous with the term “forest development roads” as used in 23 U.S.C. 205

Noxious Weed ~ Any plant so designated by the Weed Control Regulations and identified on a regional district noxious weed control list. They are generally non-native and resistant to control efforts

Overstory ~ The portion of trees in a forest which forms the uppermost layer of foliage

Peak Flow ~ The greatest stream or river flow occurring in a year from a single storm event

Pre-commercial Thinning ~ thinning that does not produce merchantable material

Quadratic Mean Diameter ~ the measure of average tree diameter conventionally used in forestry. Quadratic Mean Diameter was chosen as an indicator because of its relationship to the health of trees and susceptibility to damage from fire and its relationship to calculating Stand Density Index. Quadratic Mean Diameter combined with trees per acre (TPA) also reflects the number of small diameter trees that may function as ladder fuels

Record of Decision ~ A document separate from but associated with an environmental impact statement that states the management decision and provides the rationale for that decision

Residual ~ The trees remaining after harvesting; also known as the crop trees

Resilience ~ An ecosystem's ability to maintain structure and patterns of behavior in the face of disturbance

Riparian ~ In general, characterized by being situated on the bank of a river or other body of water; in ecology, the term is applied both to species that live near streams and to the area adjacent to streams where vegetation and microclimate are influenced by the presence of the stream

Riparian Reserves ~ A land allocation in the Forest Plan that includes an aquatic ecosystem and the adjacent upland areas directly affecting it. It also includes unstable and potentially unstable lands that are not associated with aquatic areas. Specific Standards and Guidelines provide direction for these areas as outlined in Management Area 10 of the Forest Plan

Risk ~ The chance of loss

Risk Ratio (for cumulative watershed effects model) ~ Amount of the disturbance in the watershed relative to the hydrologic or sediment inference point

Road ~ A motor vehicle travelway over 50 inches wide, unless classified and managed as a trail. A road may be classified (a National Forest Transportation System road) or temporary (36 CFR 212.1)

- **Classified Roads:** Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1)
- **Temporary Roads :** Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be a part of the forest transportation system and not necessary for long-term resource management (36 CFR 212.1). For purposes of this project, temporary roads are assumed to have a ten to 15-foot-wide driving surface, with an average driving surface width of 12 feet and a 15 to 30-foot-wide road prism width, depending on steepness of slope
- **Unclassified Roads:** Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1). The regulations at 36 CFR 223.37 require revegetation within ten years.

Road Maintenance ~ The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective

Scoping ~ The process used to identify the scope of issues to be addressed and to determine the relevant issues related to a proposed action

Sediment ~ Soil particles in water. Suspended sediment consists of small soil particles carried along by the water's turbulent flow

Silviculture ~ The art and science of growing and tending forest vegetation. It includes controlling the establishment, composition, and growth of forests for specific management goals

Silviculture Prescription ~ A site-specific operational plan that describes the forest management objectives for an area. It prescribes the method for harvesting the existing forest stand, and a series of silviculture treatments that will be carried out to establish a free growing stand in a manner that accommodates other resource values as identified

Skyline Yarding System ~ Moving logs from the stump to the landing either partially or fully suspended by a cable

Snag ~ A standing dead tree

Social Analysis ~ Analysis that uses social science information to determine how proposed actions would affect humans

Soil Porosity ~ State of having pores or holes in the soil that hold air or water; permeability

Soil Productivity ~ The capability of a soil to produce a specific crop such as fiber, forage, etc., under defined levels of management

Stand ~ A community of trees or other vegetation uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities

Stand Density Index: A relative measure of the amount of stocking on a forest area. Often described in terms of stems per acre

Standard and Guideline ~ A principle requiring a specific level of attainment, a rule to measure against

Stocking ~ The degree to which trees occupy the land, measured by BA and/or number of trees by size and spacing, compared with a stocking standard; that is, the BA and/or number of trees required to fully utilize the land's growth potential. Where tree growth is inhibited due to competition from too many trees, the site is said to be overstocked

Stocking Control ~ See thinning

Suppression Forces ~ Resources used to fight a fire, consisting of firefighters with hand tools at a minimum; may also include fire engines and bulldozers, helicopters and tanker planes

Suppressed Trees ~ Smaller trees in the lower canopy layer

Thinning ~ Removing trees from a stand to redistribute the growth potential or to benefit the quality of the residual stand

Threatened Species ~ Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range

Torching ~ Ignition and subsequent flare-up of a fire, usually burning from the bottom to the top of a tree or small group of trees

Tree Crown ~ Leafy portion

Turbidity ~ Deposition of substrate material suspended in water

Understory ~ Vegetation (trees or shrubs) growing under the canopy formed by taller trees.

Vertical Fuels ~ Standing vegetation, either live or dead

Watershed ~ The entire land area that drains to a specific point

- **5th field watershed:** A watershed that ranges from about 40,000 to 250,000 acres in size
- **6th field watershed:** A watershed that ranges from about 10,000 to 40,000 acres in size
- **7th field watershed:** A watershed or drainage that ranges from about 2,500 to 10,000 acres in size

Watershed Analysis ~ Watershed analysis is a systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives

Wet Weather Operations Standards ~ Specific information used to help determine when activities are at risk of not meeting BMPs. The guidelines are used to determine if conditions are favorable for wet weather or winter operations, and to provide guidance as to when conditions warrant suspension of operations, when operations may begin or resume, or when and what remedy may be appropriate.

4.3.3 Literature Cited

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Appendix A. Treatment Prescriptions by Unit

Table 23. Alternative 2 treatments by unit.

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
141	Ridgetop Fuels	Handpile	N/A	Burn Piles	58
142	Ridgetop Fuels	Handpile	N/A	Burn Piles	10
143	Ridgetop Fuels	Handpile	N/A	Burn Piles	10
100	Ridgetop Fuels	Handpile	N/A	Burn Piles	6
145	Ridgetop Fuels	Mastication	N/A	N/A	17
146	Ridgetop Fuels	Mastication	N/A	N/A	53
147	Ridgetop Fuels	Underburn	N/A	N/A	233
140	Ridgetop Fuels	Handpile	N/A	Burn Piles	25
144	Ridgetop Fuels	Handpile	N/A	Burn Piles	7
M1	Meadow Treatment	Handpile	N/A	Burn Piles	4
RO	Roadside Fuels	Handpile and Hazard Tree Removal	Tractor Endlining	Burn Piles	615
43	Silvicultural	Handpile	N/A	Burn Piles	4
44	Silvicultural	Handpile	N/A	Burn Piles	5
45	Silvicultural	Handpile	N/A	Burn Piles	7
46	Silvicultural	Handpile	N/A	Burn Piles	6
47	Silvicultural	Handpile	N/A	Burn Piles	6
71	Silvicultural	Handpile	N/A	Burn Piles	38
P1	Silvicultural	Handpile	N/A	Burn Piles	6
73	Silvicultural	Mastication	N/A	N/A	10
125	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	37
128	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	51
130	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	18
136	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	12
103	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	53
105	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	31
104	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	49
107	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	36

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
101	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	15
102	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	48
106	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	24
115	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	16
116	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	19
118	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	10
117	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	15
121	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	42
112	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	69
110	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	77
111	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	40
109	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	1
108	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	8
120	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	11
119	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	12
114	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	2
113	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	13

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
122	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	43
129	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	24
137	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	21
138	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	8
70	Silvicultural	Mastication/Handpile	N/A	Burn Piles	31
42	Silvicultural	Mastication	N/A	N/A	9
48	Silvicultural	Mastication	N/A	N/A	9

Table 20. Alternative 3 treatments by unit.

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
141	Ridgetop Fuels	Handpile	N/A	Burn Piles	57
142	Ridgetop Fuels	Handpile	N/A	Burn Piles	9
143	Ridgetop Fuels	Handpile	N/A	Burn Piles	10
144	Ridgetop Fuels	Handpile	N/A	Burn Piles	20
100	Ridgetop Fuels	Handpile	N/A	Burn Piles	6
146	Ridgetop Fuels	Masticate	N/A	N/A	53
145	Ridgetop Fuels	Masticate	N/A	N/A	29
147	Ridgetop Fuels	Underburn	N/A	N/A	233
140	Ridgetop Fuels	Handpile	N/A	Burn Piles	25
M1	Meadow Treatment	Handpile	N/A	Burn Piles	4
RO	Roadside Fuels	Handpile and Hazard Tree Removal	Tractor Endlining	Burn Piles	740
43	Silvicultural	Handpile	N/A	Burn Piles	4
44	Silvicultural	Handpile	N/A	Burn Piles	5
45	Silvicultural	Handpile	N/A	Burn Piles	2
46	Silvicultural	Handpile	N/A	Burn Piles	6
47	Silvicultural	Handpile	N/A	Burn Piles	6
71	Silvicultural	Handpile	N/A	Burn Piles	38

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
P1	Silvicultural	Handpile	N/A	Burn Piles	4
128	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	30
130	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	0
103	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	24
102	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	27
115	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	16
117	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	11
121	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	14
110	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	50
111	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	21
120	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	11
137	Silvicultural	Commercial Harvest	Ground-based Harvest	Underburn	4
70	Silvicultural	Masticate/Handpile	N/A	Burn Piles	23
73	Silvicultural	Masticate/Handpile	N/A	Burn Piles	5
42	Silvicultural	Masticate	N/A	N/A	7
48	Silvicultural	Masticate	N/A	N/A	8

Table 21. Unit-specific Riparian Reserve treatments and limitations for alternative 2.

Unit #	Treatment Type	Acres	Equipment Exclusion Distance (feet)	No Treatment Buffer Distance (feet)	Recommended Treatment	Treatment Notes
Unit 102	Tractor	13.0	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component	
Unit 103	Tractor	4.5	None - see notes	None - see notes	As per silviculture prescription	Outer Riparian Reserve is dry with pines and openings. Road separates stream from unit. Riparian Reserve within unit is not functioning as riparian due to topographic configuration and disconnect by road (e.g., is not influencing sediment or temperature). See Unit 102 for prescription adjacent to stream
Unit 104	Tractor	14.80	170' - perennial 100' - intermittent	100' - all streams No treatment between the two intermittent channels	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component (No treatment between the two intermittent channels)	No treatment in between the two intermittent channels. Shade varied from 100% where water was flowing to 40% where stream is subsurface.
Unit 106	Tractor	1.78	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component	
Unit 107	Tractor	5.12	100' - all streams 100' - meadow	100' - all streams 100' - meadow	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree	Wet meadow and spring near cabin. Spring on west side of unit. Dense fir stands lacking diversity.

Unit #	Treatment Type	Acres	Equipment Exclusion Distance (feet)	No Treatment Buffer Distance (feet)	Recommended Treatment	Treatment Notes
					component	
Unit 108	Tractor	3.48	50' - pond 50' - small stream (between pond/meadow) 50' - meadow	50' - pond 50' - stream 50' - meadow	No treatments within 50' pond, stream, or meadow	Spring pond is approximately 12'x18', runs downhill for 50' and then goes subsurface. Treatment will not affect shade.
Unit 110	Tractor	8.76	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component	
Unit 111	Tractor	6.42	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component	
Unit 113	Tractor	0.21	None - see notes	None - see notes	As per silviculture prescription	Unit intersects very edge of Riparian Reserve; no water in channel; no effects to intermittent stream.
Unit 118	Tractor	5.18	25' - all streams	25' - all streams	As per silviculture prescription outside 25' treatment buffer.	Conifer dominated Riparian Reserve, no hardwoods. Channel is ephemeral and dries out early in year - set exclusion area to average edge of "inner gorge" (~25'). Old temp road can be used for stream crossing when dry.
Unit 119	Tractor	1.98	100' - all streams	100' - all streams	100' - all streams	Mapped as perennial but is an intermittent channel. At time of visit, the channel was dry. Intermittent channel at edge of unit.
Unit 121	Tractor	6.78	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin	SW aspect, drier site with incised stream channel. Fir

Unit #	Treatment Type	Acres	Equipment Exclusion Distance (feet)	No Treatment Buffer Distance (feet)	Recommended Treatment	Treatment Notes
					and treat for fuels; enhance large tree component	encroachment
Unit 122	Tractor	7.63	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component	Wetter N facing site. Springs and unstable areas.
Unit 125	Skyline	21.18	170' - perennials 100' - intermittent	170' - east perennial 100' - west perennial and intermittent	Outer 70' Riparian Reserve [west perennial and intermittent] - thin and treat for fuels; enhance large tree component	
Unit 128	Skyline	15.26	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component	Steep unit; riparian on western intermittent is full of ladder fuels from dense small conifers. Recommend hand thinning small conifers and burn outside 100'.
Unit 129	Tractor	2.00	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component	
Unit 138	Tractor	1.63	100' - all streams	100' - all streams	Outer 70' Riparian Reserve - thin and treat for fuels; enhance large tree component	
Unit 42 Unit 48 Unit 70 Unit 73	Masticator	16.01	170' - all streams	170' - all streams	No treatment within 170' Riparian Reserve management area	

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Appendix B. Vicinity and Treatment Maps

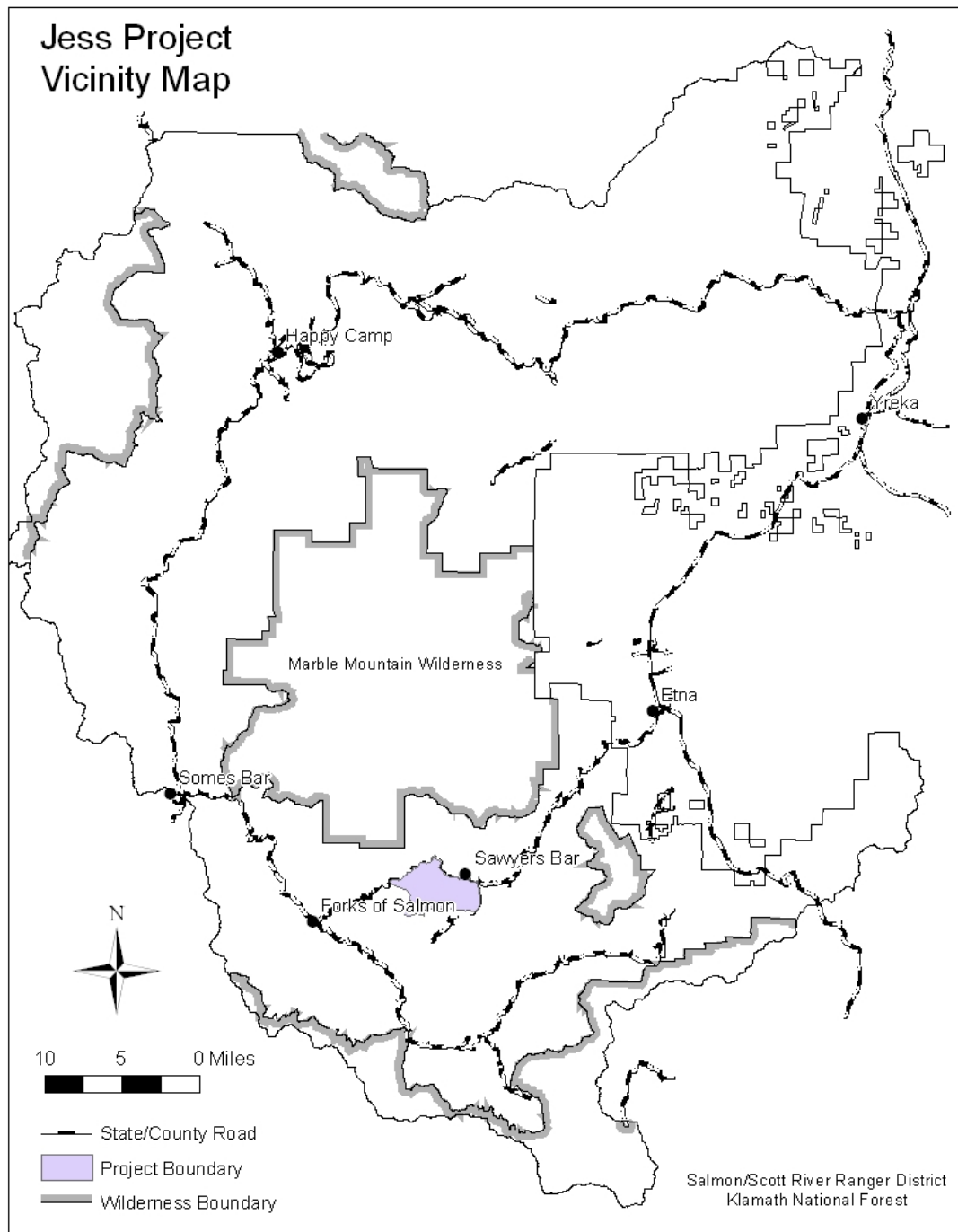


Figure 1. Vicinity map for Jess project.

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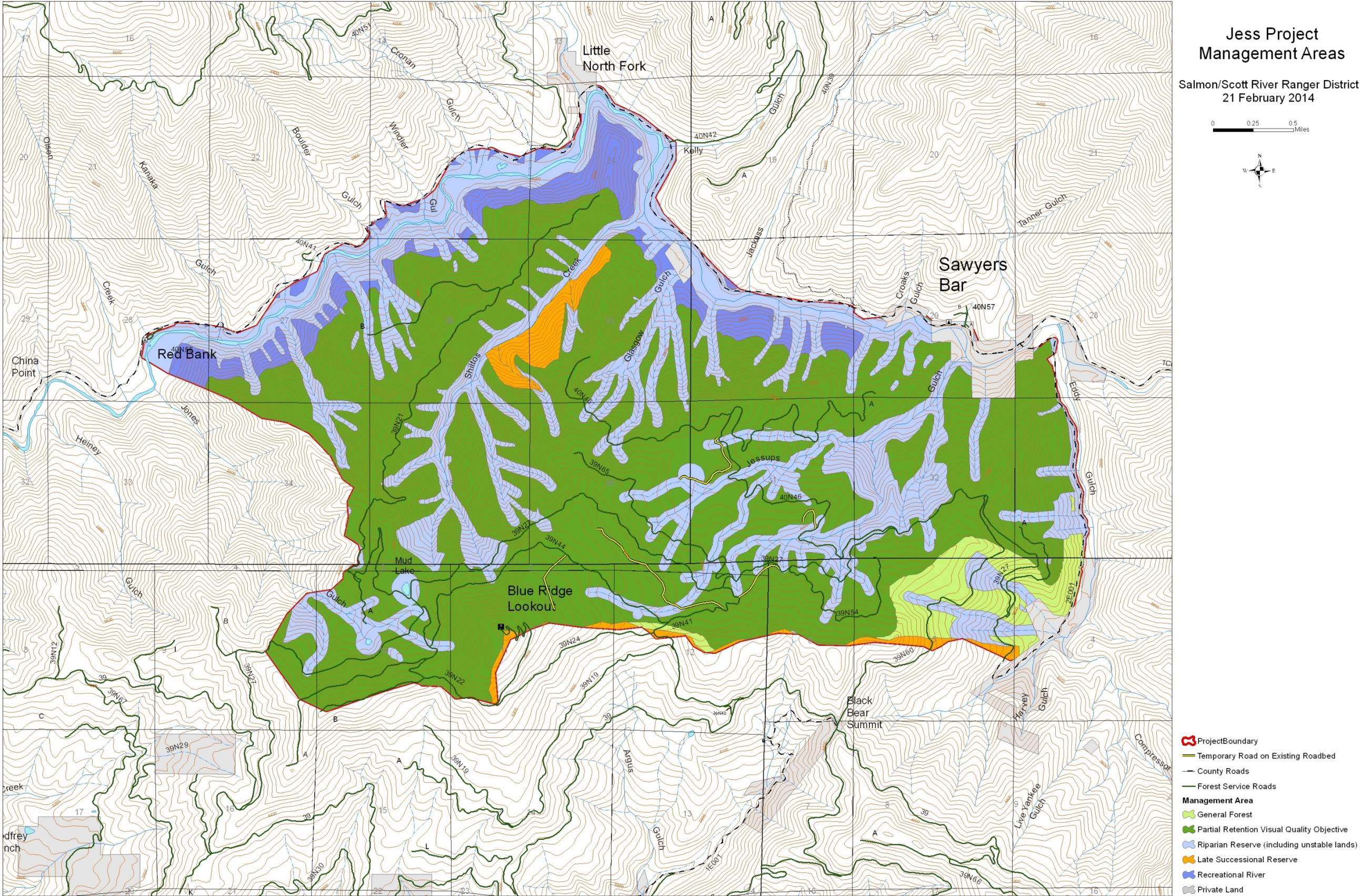


Figure 2. Management areas in the project boundary.

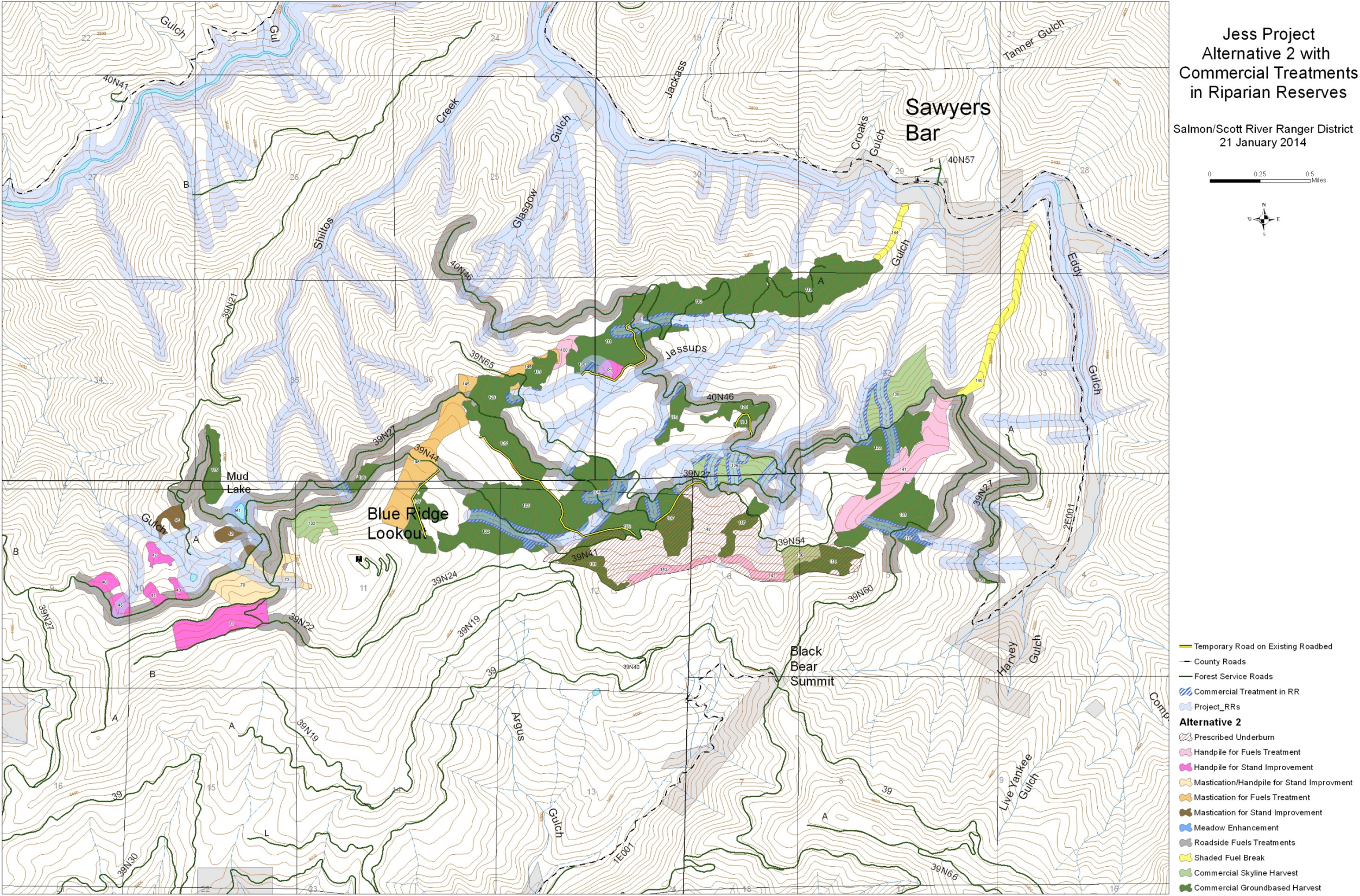


Figure 3. Alternative 2.

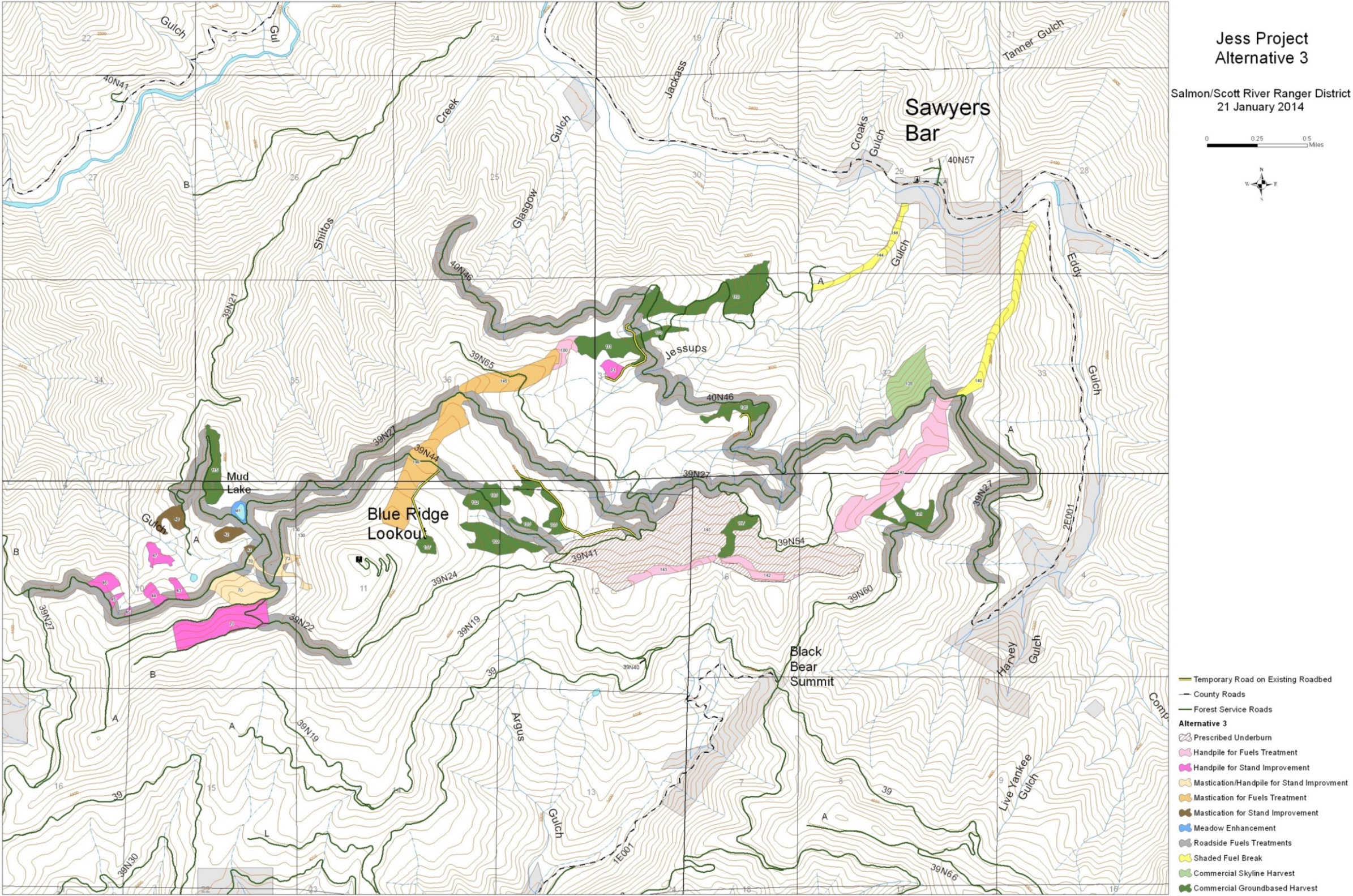


Figure 4. Alternative 3.

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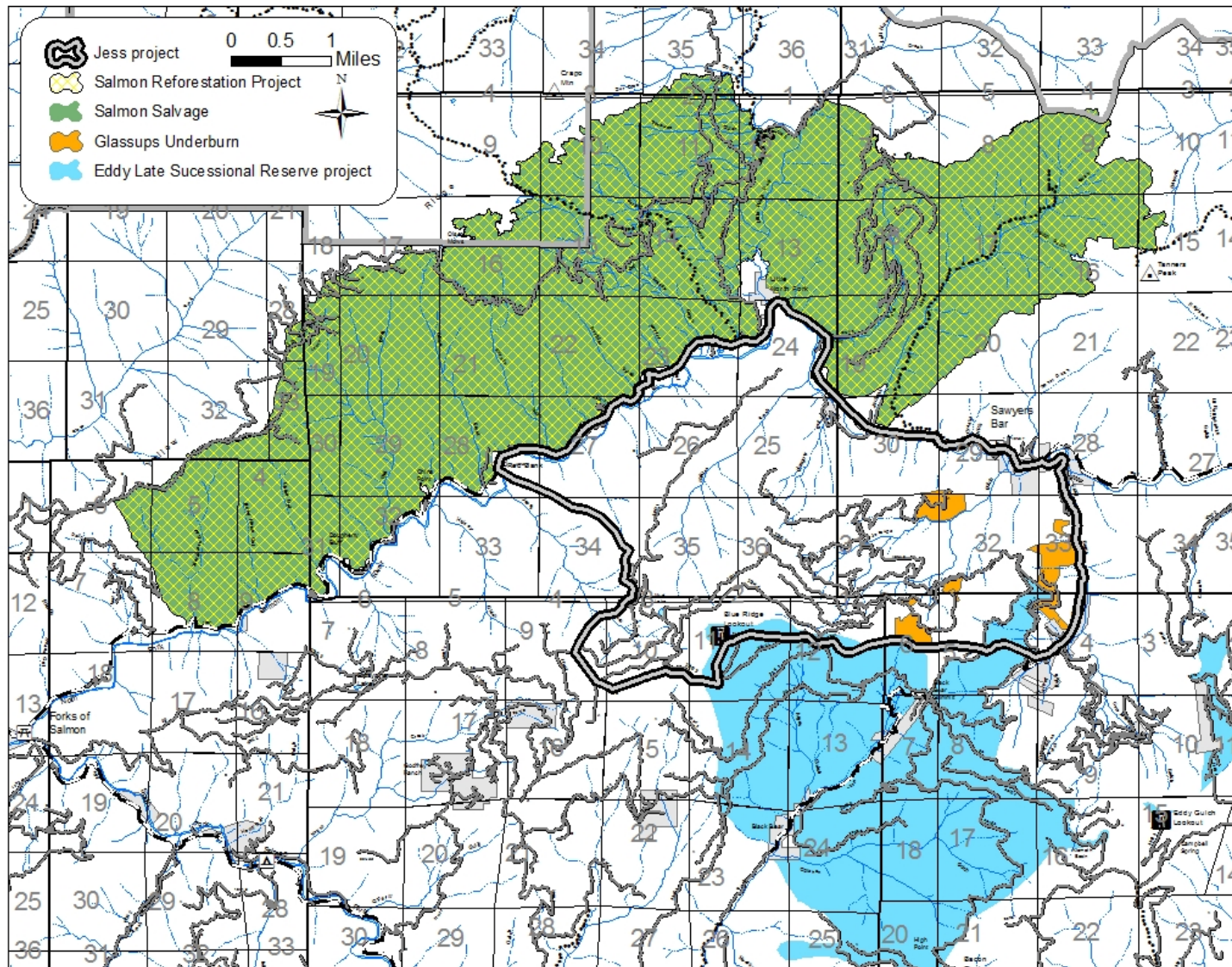


Figure 6. Project area boundaries for actions potentially considered in cumulative effects analysis.
***North Fork Roads Stormproofing project not included.**

Appendix C. Actions Considered for Cumulative Effects

This appendix lists the current and reasonably foreseeable future actions that may be considered in addition to the proposed project; a map of the project boundaries for these projects is provided above (Figure 6). The list of ongoing and reasonably foreseeable actions includes actions on the Forest within the Olsen Creek, Shiltos Creek, Eddy Gulch and Jessups Gulch 7th field watersheds. There were no identified ongoing or reasonably foreseeable actions on private lands in the 7th field watersheds. The present and reasonably foreseeable future actions that are considered for cumulative effects analysis may vary by resources (see Chapter 3 and resource reports for resource-specific details).

North Fork Roads Stormproofing project (Implementation ongoing) is located in Township (T) 39N, Range (R) 10W, Sections 4, 5, and 8 Mount Diablo Meridian (MDM); T39N, R11W, Sections 3-6, 10, 11, 14, 15, and 16 MDM; T39N, R12W, Sections 7-12, and 16 MDM; T40N, R10W, Sections 8, 9, 14-16, 18-23, 29-30 MDM; T40N, R11W, Sections 7, 12-13, 18-19, 26, 29, 31-36, MDM; T40N, R12W, Sections 11-17, 24-26, and 34-36 MDM; T41N, R10W, Sections 20-21, and 28-29 MDM; T41N, R11W, Sections 31, and 35 MDM; T41N, R12W, Sections 26-27, and 35 MDM; T10N, R8E, Sections 6, and 16 Humboldt Meridian (HM); T11N, R8E, Sections 28, and 31 HM; which defines the entire Jess project area for the North Fork Roads Stormproofing project. It involves about 90 miles of road stormproofing requiring blading, improving road drainage, and protecting riparian and stream systems.

Eddy Late-Successional Reserve Habitat Restoration project (Implementation is ongoing) located in; T38N, R11W, Sections 2-5, 8-10, and 17-19; T38N, R12W, Sections 1-3, 9-16, and 22-24 ; T39N, R10W, Sections 2-10, 15-21, and 29-31; T39N, R11W, Sections 1-18, 20-29, and 32-36; T39N, R12W, Sections 11-14, 23-25, and 36; T40N, R10W, Sections 3-5, 8-11, and 13-35; T40N, R11W, Sections 24-27 and 34-36; T41N, R10W, Sections 2-5, 8-17, 20-24, 26-29, and 31-34; T42N, R10W, Sections 28-29 and 32-35(all Mount Diablo Meridian). The project will treat 25,969 acres of landscape-level treatments to protect late-successional habitat and communities. Within those acres are 8,291 acres of fuel management zones that would increase resistance to the spread of wildfires to adjacent watersheds. There is also 17,524 acres of prescribed to increase resiliency to wildfires and protect habitat for the northern spotted owl and other wildlife species that are dependent on late-successional forests. There would be 44 miles of Roadside treatments along emergency access routes treated in Fuel Management Zones and underburning units and 16 miles (154 acres) of Roadside treatments outside of Fuels Reduction Zones and underburning units—a total of 60 miles of Roadside treatments along emergency access routes.

Glassups Timber Sale (Implementation ongoing) located in T40N, R12W, Sections 25, 35, and 36, and T40N, R11W, Sections 18 and 19; T39N, R12W, Sections 11 and 12; and T40N, R11W, Sections 29-33, Mount Diablo Meridian. In the project, 206 acres of under burning remain to be completed. These treatments are follow-up activity fuels treatments from the Glassups Timber Sale in 2000.

Salmon Salvage project (Planning complete, implementation ongoing) is located at T40N R11W S7-10, 15-21, 30; T41N R12W S35; T40N, R12W S 10-24 and 27-31, Mount Diablo Meridian; T10N R8E S 4-6 and 8-9; T11N R8E S28 and 32-33, Humboldt. The 14,779-acre project area is within the area burned by the Salmon Complex in 2014. The project is intended to abate hazard trees along the roads, salvage fire-damaged trees and to aid in reforestation of the area. The project will meet the purpose and need on about 1,240 acres by salvage logging (on about 270 acres) and removing roadside hazard trees (on about 973 acres along 23 miles of road).

Salmon Reforestation project (Planning complete, implementation ongoing) is located in Township (T) 40 North (N), Range (R) 11 West (W), Sections 7-10, 15-21, 30; T41N, R12W, Section 35; T40N, R12W, Sections 10-24 and 27-31, Mount Diablo Meridian; T10N, R8E, Sections 4-6 and 8-9; T11N, R8E, Sections 28 and 32-33, Humboldt Meridian. The Salmon Reforestation project was developed to promote reforestation and reduce fuel loading on National Forest System lands burned during the Salmon Fire of 2013 (part of the Forks Complex). The Forest Service proposes to treat about 905 acres with combinations of site preparation and planting. These activities will help facilitate establishment of desired conifers in existing plantations and natural stands lost during the Salmon Fire.

Appendix D. Best Management Practices

Best Management Practices (BMPs) were developed to comply with Section 208 of the Clean Water Act. BMPs have been certified by the State Water Quality Resources Control Board and approved by the Environmental Protection Agency (EPA) as the most effective way of protecting water quality from impacts stemming from non-point sources of pollution. These practices have been applied to forest activities and have been found to be effective in protecting water quality within the Klamath National Forest. Specifically, effective application of the Region 5 USFS BMPs has been found to maintain water quality that is in conformance with the Water Quality Objectives in the North Coast Regional Water Quality Control Board's Basin Plan (http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/).

Region 5 Forest Service BMPs have been monitored and modified since their original implementation in 1979 to make them more effective. Numerous on-site evaluations by the North Coast Region Water Quality Control Board have found the practices to be effective in maintaining water quality and protecting beneficial uses.

The Forest monitors the implementation and effectiveness of BMPs on randomly selected projects each year. From 2000 to 2012, BMP implementation requirements were met on 78-100% (91% average) of sites sampled, and BMP effectiveness requirements were met on 88-100% (94% average) of the sites sampled (USDA Forest Service, 2013c). The critical BMP evaluation is *effectiveness* which is a field evaluation to determine how well the BMP worked to prevent sedimentation. The success rate for effectiveness has been in the high 80s and 90s each year since 1993.

Best Management Practices first identified and utilized by the Klamath National Forest are listed in appendix D of the Forest Plan. These basic BMPs have been revised over the years, and are currently similar to those listed in the 2012 Region 5 BMP update in Chapter 10 of the Soil and Water Conservation Handbook, which additionally includes a narrative and objective of each (USDA USFS 2012); and where there are differences, direction is to employ the newer BMP list.

BMP 1.1 – Timber Sale Planning Process: Requires the Interdisciplinary Team (interdisciplinary team) to consider methods of reducing water quality impacts during the planning phase of a project. This is accomplished during the planning process of the Timber Sale project.

- Skidding equipment will be restricted to slopes less than 35% and operate according to the Forest's wet weather logging guidelines. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35%.
- Tractor skidding will occur on designated skid trails. Tractors may leave skid trails to access isolated logs if ground conditions permit.

BMP 1.2 – Timber Harvest Unit Design: Requires the interdisciplinary team to consider methods of reducing water quality impacts due to changes in unit design. This is accomplished during the planning phase of a project. Examples of design changes are restricting timing of tree removal and utilizing less impacting yarding systems.

- The interdisciplinary team reviewed all units to select harvest methods

appropriate to site conditions.

- Tractor yarding equipment is generally limited to slopes less than or equal to 35%. This is incorporated into the unit layout.

BMP 1.3 – Use of Erosion Hazard Rating for Unit Design: Identifies high or very high erosion hazard areas and adjust management activities to prevent downstream water quality impacts; and to increase soil cover for those areas that have a high risk of contributing sediment into streams. This is done during the planning and layout phase of the project.

- Based on field review and site data (% slope distribution, soil texture), the Forest Soil Scientist determined the surface erosion hazard rating for each treatment unit and prescribed logging systems and soil cover needs based on the erosion hazard rating.

BMP 1.4 – Use of Sale Area Maps for Designating Water Quality Protection:

Identifies sensitive areas and water uses as part of the Timber Sale contract to assist operators in locating water concerns and applying protection methods. This is accomplished during contract preparation and implemented during layout of the sale.

- The Sale Area Map will include all protected stream-courses, unstable land features, springs, wetlands, meadows, water drafting sites, landings, temporary roads, and logging system for each unit.

BMP 1.5 – Limiting Operating Period of Timber Sale: To prevent soil compaction and erosion from operations during wet weather; and to ensure placement of erosion control structures prior to the onset of winter to reduce water quality impacts. This is accomplished during the timber sale operations.

- The project is proposed to take place during the normal operating season that is defined as April 15 to October 15 and in dry periods outside the Normal Operating Season with Line Officer approval. Activities will be restricted during periods of wet weather during the Normal Operating Season.
- For activities in the Riparian Reserves, when there is a 30% chance of rain in the next 24 hours the TSA will be on site to insure that winterization or erosion control procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.
- The Klamath Wet Weather Operation Standards (USDA Forest Service 2002) will be used for all project activities (harvest, hauling, planting).
- All landing, temporary road and skid road construction, and all existing temporary road skid road reconstruction, will be conducted during appropriate periods of weather and soil moisture to insure BMP attainment and the avoidance of adverse impacts to listed species. Forecast periods will also be of a suitable length to allow completion or winterization of the task undertaken before precipitation events occur for activities outside of the Riparian Reserves.

BMP 1.6 – Protection of Unstable Lands: Provides for special treatment of unstable areas to avoid triggering mass slope failure with resultant erosion and sedimentation.

- Cable corridors will be placed on the landscape as to minimize disturbance to

inner gorges and to avoid disturbance on active landslides and landslide toe zones.

- No silvicultural treatments will occur on unstable lands and ground-based equipment will be excluded from active landslides and landslide toe zones.

BMP 1.8 – Streamside Management Zone Designation: Designates zones adjacent to water and/or riparian areas as zones of special management. This is accomplished during the planning and layout phase of the project.

- The Riparian Reserve width is one site potential tree height was designated as 170' for perennial and intermittent streams in the project.
- Sites for water drafting for dust abatement will be designated by the Forest Service and agreed to by the purchaser.

BMP 1.9 – Determining Tractor Loggable Ground: Minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.

- Skidding equipment will be restricted to slopes less than 35%. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35%.

BMP 1.10 – Tractor Skidding Design: Designates a tractor skid pattern over steepened areas, designates tractor crossings, and reduces skid patterns in sensitive areas to reduce erosion and compaction. This is accomplished during the sale layout and operations phase of the project.

- Outside of Riparian Reserves, retain existing coarse woody debris whenever possible providing the amount of logs meets fuel management objectives. Coarse woody debris consists of downed wood within a terrestrial environment.
- Skidding equipment will be restricted to slopes less than 35%. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35%.
- Maintain existing coarse woody debris by having ground-based equipment avoid the larger diameter logs to the extent practical.
- Limit equipment disturbance within 20 feet on either side of swales by minimizing equipment crossings and avoiding running trails up the axis of swales. Swales are shallow ephemeral channels that do not meet the definition of a Riparian Reserve because they lack annual channel scour.
- Existing skid trails will be reused whenever possible except where a less ground disturbing option is available. Designation of new skid trails will be approved by Timber Sale Administrator.

BMP 1.11 – Suspended Log Yarding in Timber Harvesting: Protect the soil mantle from excessive disturbance; maintain the integrity of the Streamside Management Zone and other sensitive watershed areas, and to control erosion on cable corridors.

- Slash or water bars will be applied to skyline corridors where necessary to minimize the concentration of surface runoff and where the ground cover is below 50%.

- All skyline yarding stands will require one end suspension. Full suspension over stream channels is desired where possible.
- Where ground-based yarding/endlining is used to retrieve logs from Riparian Reserve equipment exclusion zones and if gouging occurs that creates a trough for overland flow to enter the channel, waterbars will be installed or slash applied to the area.

BMP 1.12 – Log Landing Location: Locate new landings or reuse existing landings in such a way as to avoid watershed impacts and associated water quality degradation.

- Construct new landings will occur outside both stream-course and unstable-land Riparian Reserves and away from locations where sediment is likely to enter streams (areas that have a hydrologic connection to streams).
- Existing landings will be used to the extent possible, except existing landings within 50 feet of the slope break to a stream channel or inner gorge will not be used.

BMP 1.13 – Erosion Prevention and Control Measures During Timber Sale

Operations: Ensures that Purchasers operations shall be conducted reasonably to minimize soil erosion. This is accomplished during the pre-operations meeting with the purchaser, and throughout the operations phase of the timber sale.

- Erosion control measures are discussed during the pre-operations meeting with the purchaser and the Forest Service. They are updated throughout the operations phase of the timber sale.
- During project implementation, final locations and design characteristics for landings and new roads will be reviewed by watershed personnel prior to construction as needed.
- The Klamath Wet Weather Operation Standards (USDA Forest Service 2002) will be used for all project activities (harvest, hauling, planting).

BMP 1.16 – Log Landing Erosion Prevention and Control: Works to reduce erosion and subsequent impacts sedimentation from log landings. Timber Sale Contract provide for erosion prevention and control measures on all landings. This is best done by design of landing drainage measures during the planning phase of the project, and implemented during the operations phase.

- Once project activities are completed, hydrologically stabilize landings by re-establishing natural runoff patterns to protect water quality.
- During construction and maintenance of any landings, material will not be sidecast (i.e., fill material will not be pushed downslope of landing).

BMP 1.17 – Erosion Control on Skid Trails: Employs preventive measures such as drainage structures to reduce water concentration and erosion. This is accomplished during the operations phase of the project. Because of the timing of this project, pre-staging of straw bales for timely construction of water bars will be called for.

- Where ground-based yarding/endlining is used to retrieve logs from Riparian Reserve equipment exclusion zones and if gouging occurs that creates a trough for overland flow to enter the channel, waterbars will be installed or slash applied to

the area.

- At project completion, permanent operating water bars will be installed and/or repaired as necessary on all skid trails, and slash scattered on all skid trails if necessary.

BMP 1.18- Meadow Protection during Timber Harvest: The objective is to avoid damage to ground cover, soil and hydrologic function of meadows.

- Commercial thinning may occur up to the edge of wetlands or meadows, when the purpose is enhancement of meadow/wetland features. Heavy equipment will not operate on meadows. Trees felled in wetlands will be left on site.

BMP 1.19 – Streamcourse Protection: Protects the natural flow of streams and reduces the entry of sediment and any other pollutants into streams. The location of stream crossings must be agreed to by the Sale Administrator and the Hydrologist. The accomplishment of the objective of this measure is during the operations phase of the project.

- The project is proposed to take place during the normal operating season that is defined as April 15 to October 15 and in dry periods outside the Normal Operating Season with Line Officer approval. Actions will be restricted during periods of wet weather during the Normal Operating Season.
- Trees directly rooted into the banks or otherwise and obviously integral to the stability of the channel bank will not be removed.
- New skid trails and yarding corridors will be located to minimize impacts to Riparian Reserves.
- Perennial streams will not be crossed by skid trails.
- Intermittent channels may be crossed by skid trails when dry and at locations designated by the Forest Service.
- Skid trails that cross intermittent streams or dry swales will be restored before any storm (with reasonable chance of causing off-site sediment movement). Crossings will also be immediately restored after use is complete. Restoration generally consists of removing excess soil, reshaping and waterbarring former approaches, and spreading slash on the former crossing.
- No (downed) coarse woody debris will be removed from Riparian Reserve areas or stream courses with potential exceptions for hazard tree removal (see below).
- Hazard trees that have fallen or are felled within Riparian Reserves will generally be left on site. Fallen or felled hazard trees may be removed from Riparian Reserves if:
 - i. Trees must be removed to provide safe road passage or campground access and function; OR
 - ii. Those trees would pose a substantial risk to the Forest road drainage system integrity.
- Activities which require culvert replacement or removal will occur during the least critical periods for water and aquatic resources: when streams are dry; during low-water conditions; and/or in compliance with spawning and breeding season

restrictions. Low-water/dry conditions for the project area generally occur July through October, dependent upon snowpack and individual drainage characteristic. The District Fish Biologist or Hydrologist will be consulted for appropriate timing at specific locations.

BMP 1.20 – Erosion Control Structure Maintenance: Requires periodic inspection of erosion control structures to assess maintenance needs and effectiveness. This is accomplished during the operations and post-operations phase of the project; this ensures the adequacy of erosion control measures.

- Erosion Control Measures will be maintained for up to 1 year post-installation.

BMP 1.21 – Acceptance of Erosion Control Measures Before Timber Sale Closure: Erosion control measures are inspected for adequacy to ensure erosion control as planned. This is accomplished during the post-operations phase of the project during the contract final inspection.

- At project completion, permanent operating water bars will be installed and/or repaired as necessary on all skid trails, and slash scattered on all skid trails if necessary.
- The Timber Sale Administrator will inspect the Erosion Control Measures for compliance with contract.

BMP 2.4 – Road Maintenance and Operations (Temporary Roads): The objective is to improve road slope stabilization by applying mechanical and vegetative measures. This is accomplished during the operations phase of the project.

- Temporary road ingresses will be obliterated or effectively blocked to vehicle access.
- The proposed temporary roads on existing road beds will be outsloped, covered with slash if needed and blocked after the harvest season (and prior to the first winter after use). The temporary roads will be decommissioned (hydrologically restored) at project completion. Decommissioning includes removal of culverts and fills at stream crossings, out-sloping of road surfaces, and obliteration (re-contouring) of temporary road segments.

BMP 2.4 – Road Maintenance and Operations (System Roads)

- Improvements on the existing National Forest Transportation System roads to the project area will not over-steepen the road cuts, will minimize sidecasting, and will maintain the ditches and cross drains or any outslope of the roadway.
- Spot rocking will be used as needed in wet areas where damage to the roadbed may occur and adversely create rills which may move sediment into stream channels.
- Use erosion control methods on access and/or main roads that are treated for dust abatement to prevent any water leakage from causing stream sedimentation.

BMP 2.5 - Water Source Development Consistent with Water Quality Protection: The objective is to limit and mitigate the effects of water source development through the planning of impoundments and withdrawals.

- Draft water only at designated water drafting sites.

- Water drafting sites located within fish-bearing streams may not be modified, except rocking the approach to prevent sedimentation.
- Water drafting sites located in non-fish-bearing waters only may include minor in stream modification, such as fine sediment removal and building of board/plastic dams, at the discretion of the project Fish Biologist or Hydrologist. All boards and plastic will be removed after use. Approaches may also be rocked, as needed, to prevent stream sedimentation.
- Water drafting by more than one truck shall not occur simultaneously.
- Drafting from the two fish-occupied (anadromous) sites on the North Fork Salmon River will be allowed only from June 15th through October 15th each year. Approved drafting sites at non-fish-bearing locations elsewhere in the project area may be utilized year-round.
- For the fish-occupied (anadromous) drafting sites on the North Fork Salmon River, the *NOAA Fisheries Water Drafting Specifications* guidelines will be used. They include, but are not limited to, the following:
 - When water drafting in habitat potentially occupied by Chinook and Coho salmon, intakes will be screened with 3/32-inch mesh for rounded or square openings, or 1/16-inch mesh for slotted openings. When in habitat potentially occupied by steelhead trout, intakes will be screened with 1/8-inch mesh size. Wetted surface area of the screen or fish-exclusion device shall be proportional to the pump rate to ensure that water velocity at the screen surface does not exceed 0.33 feet/sec. (NMFS 2001)
 - Fish screen will be placed parallel to flow.
 - Pumping rate will not exceed 350 gallons-per-minute or 10% of the flow of the anadromous stream drafted from.
 - Pumping will be terminated when tank is full.
- For non-fish-occupied drafting sites in the project area, drafting will be as per the text of the BMP, including:
 - Drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cubic feet per second.
 - Drafting rate should not exceed 50 percent of surface flow.
 - Drafting should cease from when bypass surface flow drops below ten gallons per minute.

BMP 2.11 - Servicing and Refueling of Equipment: Prevent fuels, lubricants, cleaners, and other harmful materials from discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources.

- No fueling or servicing of vehicles will take place within Riparian Reserves.
- No fueling/refueling of mechanical equipment will occur within 100 feet of any flowing watercourse or intermittent drainage.
- A spill containment kit will be available at the location of any refueling or servicing.

- Report spills and initiate appropriate clean-up action in accordance with applicable State and Federal laws, rules and regulations. The Forest Hazardous Materials Coordinator's name and phone number shall be available to Forest Service personnel who administer or manage activities utilizing petroleum-powered equipment.
- If a spill does occur, the Hydrologist will notify the Water Board.
- In the occurrence of a spill may affect listed aquatic species, NOAA Fisheries will be notified for emergency consultation.

BMP 2.13 – Erosion Control Plan: Effectively limit and mitigate erosion and sedimentation from any ground-disturbing activities, through planning prior to commencement of project activity, and through project management and administration during project implementation.

- An Erosion Control Plan will be completed prior to project implementation.
- The Forest's Wet Weather Operations Standards are included in the Erosion Control Plan.

BMP 5.2 – Slope Limitations for Mechanized Equipment Operations: The objective is to reduce gully and sheet erosion and associated sediment production by limiting tractor use.

- Limit the operation of track-mounted masticators to slopes less than 45%.
- Units where a masticator is the primary treatment (Units 42, 48, 70, 73) the equipment will be exclusion zone will be 170 feet from the stream channel (the entire Riparian Reserve), although the arm may reach within this zone to masticate vegetation. Incidental use of masticators elsewhere in the project area the equipment will not operate within 100 feet of perennial/intermittent less than one foot wetted width and not within 100 feet of any perennial stream greater than one foot wetted width; and not operated within break in slope of inner gorge. Crossings of dry intermittent channels may occur at locations as designated by the Forest Service. No perennial streams will be crossed by masticators.

BMP 5.5 – Disposal of Organic Debris: The objective is to prevent gully and surface erosion with associated reduction if sediment production and turbidity during and after treatment.

- Fuel treatment prescriptions will be designed to maintain post-treatment soil cover ranging between 50% and 70%, depending on slope steepness and fuel reduction treatments.

BMP 5.6 – Soil Moisture Limitations for Mechanical Equipment Operations: The objective is to prevent soil compaction, rutting, and gulling that may result in increased sedimentation and turbidity.

- All ground based equipment will follow the Wet Weather Operation Standards.

BMP 6.3 Protection of Water Quality from Prescribed Burning Effects: The objective is to maintain soil productivity; minimize erosion; minimize ash, sediment, nutrients, and debris from entering water bodies.

- Hand piles will be placed in a checkerboard pattern whenever possible (not one pile directly above another). Hand piles will be small in size, six feet or less in diameter.
- Burn piles will not be placed within 30 feet of perennial stream channels greater than one foot wetted width, or within 15 feet of intermittent stream or perennials less than one foot wetted width. Treatment should not occur on granitic soils, where sideslopes exceed 35%, or where existing ground cover is less than 50%.
- When underburning is prescribed, avoid as possible the construction of handlines within Riparian Reserves closer than 25 feet to a watercourse and/or within riparian vegetation.
- Handlines will be mitigated (waterbarred and covered with organic material) immediately following prescribed burning and under safe conditions.
- When underburning within Riparian Reserves, maintain at least 90% of the coarse woody debris (both standing and on the ground) as unburned or not consumed.
- Within Riparian Reserves, prescribed fire effects will mimic a low intensity backing fire and ignition will usually not occur there. Hand piles may have higher fire intensity in order to consume pile material.

Appendix E. Collaborative Effort

The purpose of this appendix is to summarize the changes to the Jess project made during the planning of the project as a result of collaboration efforts and internal review. The focus of the collaboration effort for the Jess project is to identify common interests and bridge disagreements over natural resource management; the effort will include examinations of scientific literature, potential actions and environmental concerns (including the human environment). The process is intended to encourage and facilitate the use of natural resource principles to promote ecosystem health, diversity, and economic and community well-being.

The objectives of collaboration efforts include to:

- Improve transparency of the planning process;
- Foster cooperative information exchange;
- Develop stakeholder support for the project;
- Provide for early recognition and resolution of issues; and
- Provide for a well-informed decision by the Forest

At the initiation of the project treatments on the lower 1/3 of the slope were included. The focus was on forest health and resiliency (

Figure 7). In March 2011, the Regional Forester (Region 5) asked the Forests to incorporate ecological restoration into projects where it would be beneficial. The Forest felt that the Jess project fit this bill. The Forest initiated the collaborative efforts for the Jess project in January 2012 to incorporate comments/concerns about the project into the planning process, to make the process more transparent and to foster information exchange. Throughout the planning process, Fish and Wildlife Service worked with the District Biologist to adjust habitat typing after field verification.

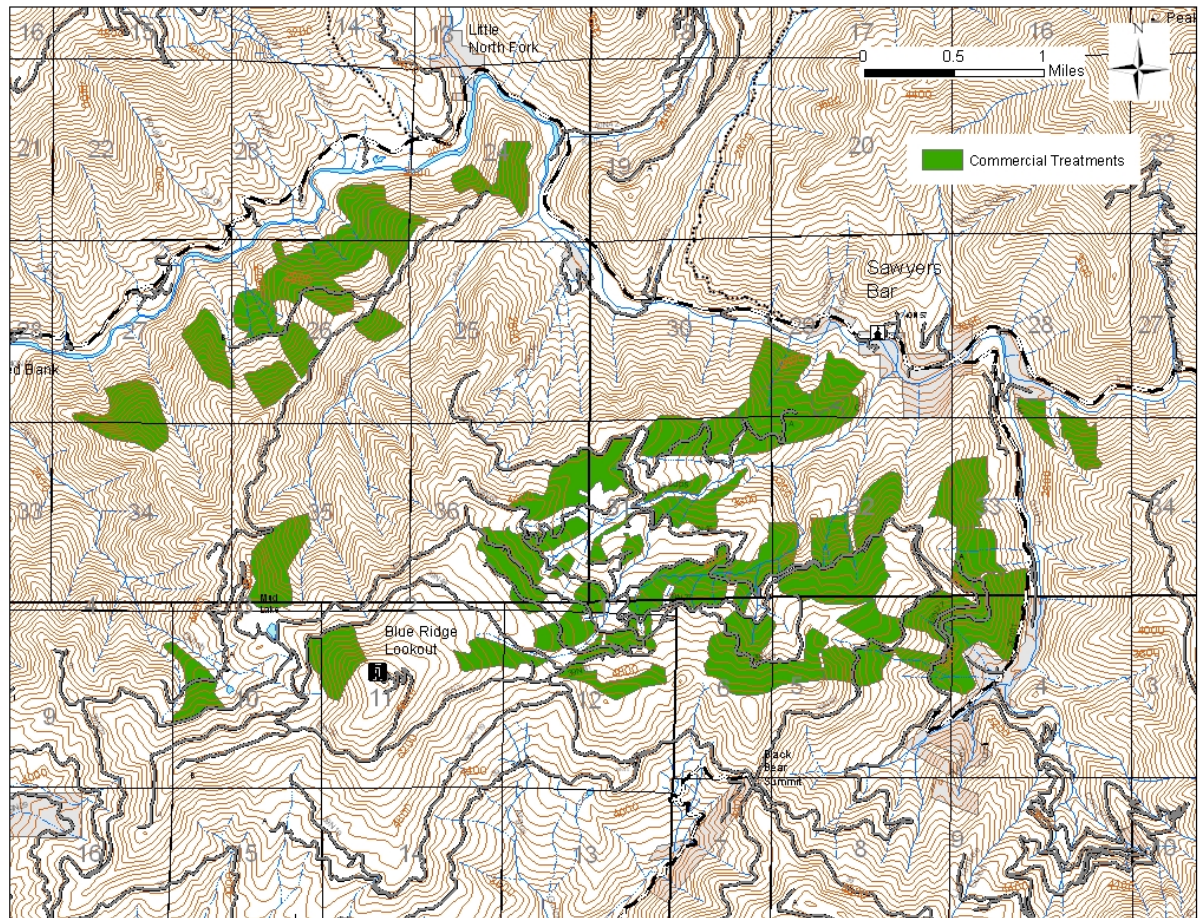


Figure 7. Initial commercial treatments considered by the Forest for treatment in the Jess project prior to incorporating Ecological Restoration into the purpose and need.

The project was presented to the collaborators at the meetings on January 25, 2012 and March 15, 2012. As a result of the comments at these two meetings (Figure 8):

- Community protection was added to the purpose and need for the project.
- The fuels strategy was developed minimizing handpiling where possible and placing treatments strategically on the landscape.
- Units that needed new temporary roads were dropped from the project.
- The term “sustainable yield” was removed from the purpose and need and rural economic health was added.
- Most of the commercial treatments on the lower 1/3 of the slope were dropped and treatments on the ridge became the focus, to better align with the Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004) and the restoration concept.
- Roadside treatments were included to improve safety of ingress/egress for the public and firefighters as suggested by the Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004).

- The non-system roads that will be used in the project were field reviewed for consideration for hydrologic stabilization (decommissioning).
- Meadow and hardwood retention treatments were included in the treatment considerations to improve diversity and to retain the unique ecologic features on the landscape.

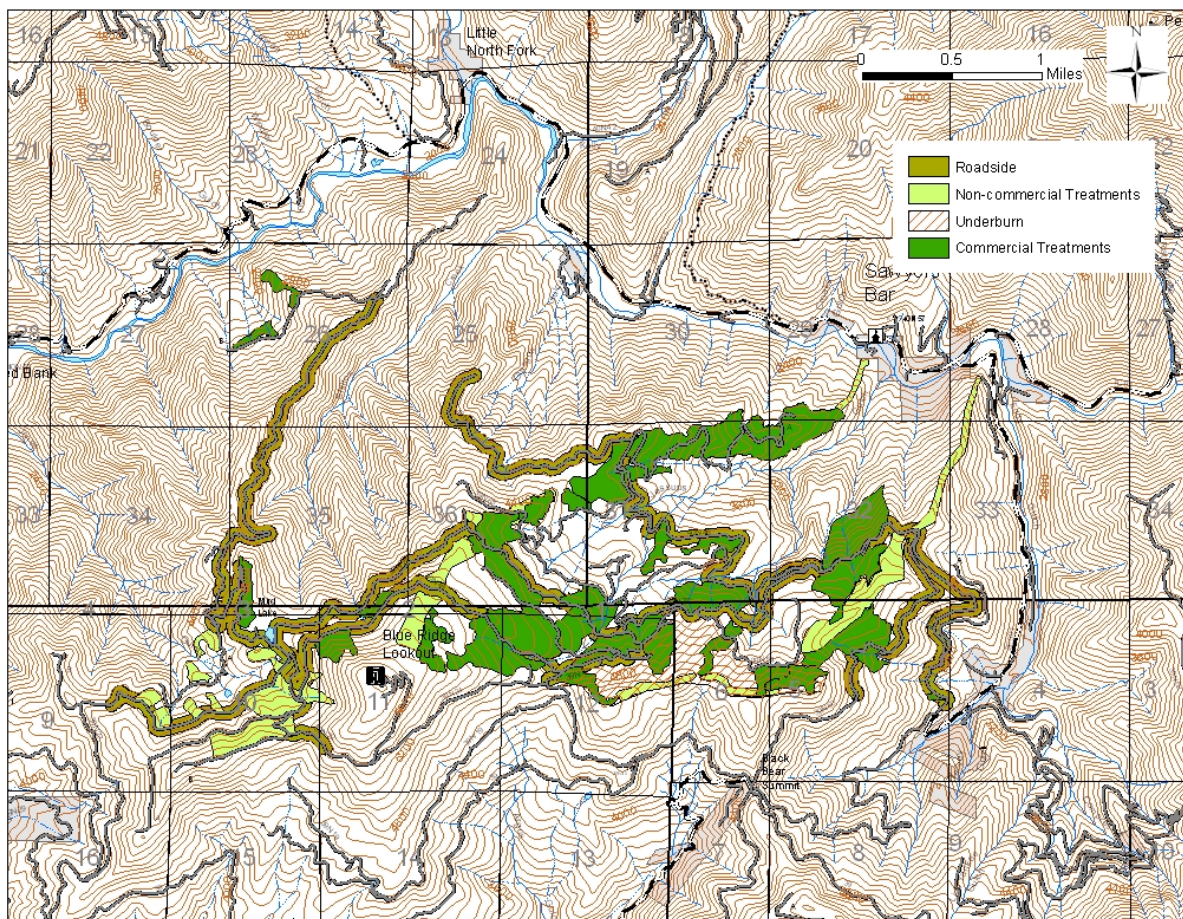


Figure 8. Commercial treatments considered after incorporating changes from the January 25, 2012 and March 15, 2012 collaborative meetings.

As a result of the field trip on June 21, 2012 a more defined collaborative process was developed by the Forest. The Forest began to put together a restoration concept for the project as suggested by the collaborators. The concept is rooted in the idea that ecosystem function is related to the pattern of trees on the landscape (Larson and Churchill, 2012). There are four ecosystem functions that are the focus of the concept for the Jess project 1) Resilience to disturbance; 2) Species and structural diversity; 3) Defensibility against wildfire; and 4) Beneficial uses of water. The Weislander mapping done in the 1940s (Weislander, 1935) was used to look at historical distribution of trees on the landscape to further inform the restoration concept (Figure 9). More details on the concept were presented at the February 5, 2014 meeting and can be found in the attached PowerPoint presentation.

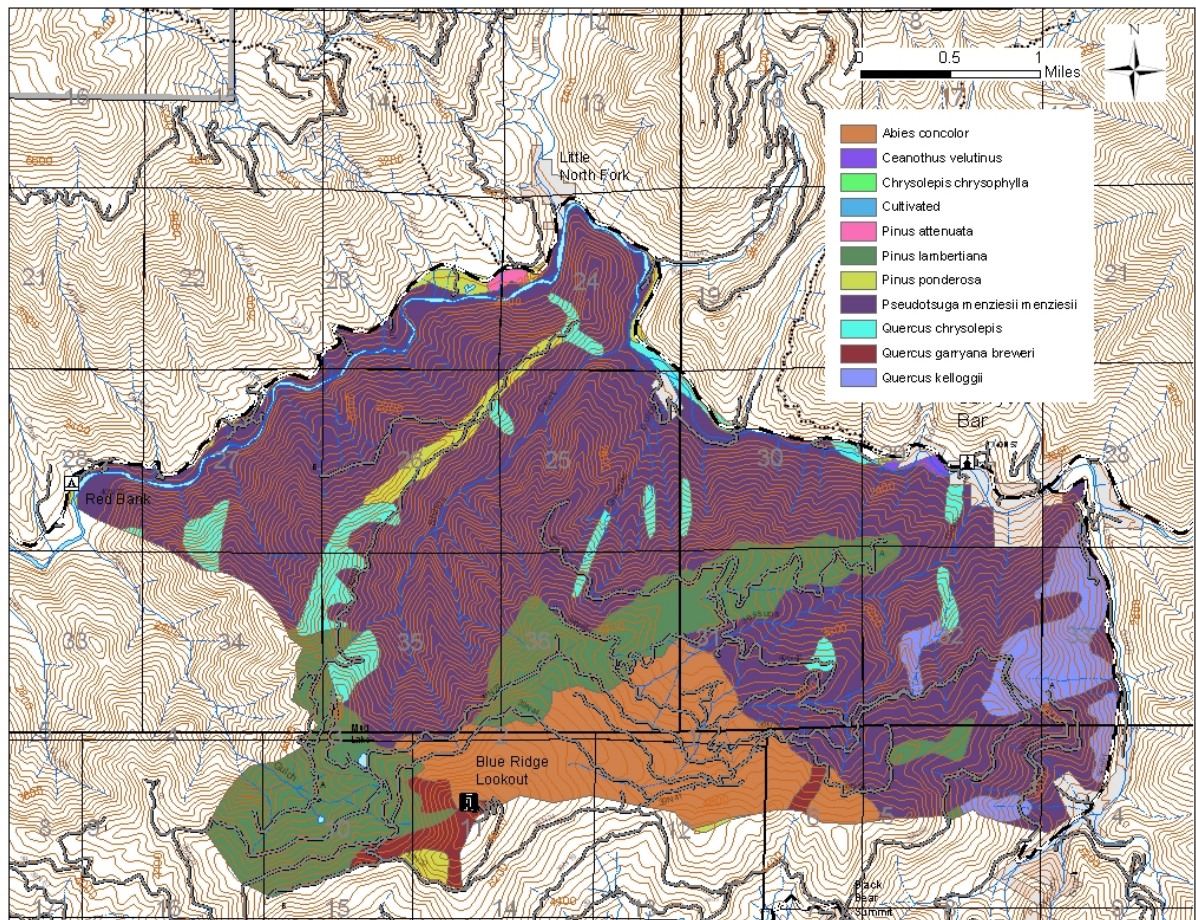


Figure 9. Historical Weislander mapping circa 1940 for the Jess project area.

Large tree retention was discussed at the field trip. The Forest has incorporated large tree retention where it meets the purpose and need of the project, specifically where preferred or historically dominant species exist, where tree characteristics indicate health and vigor, and spacing is favorable for fire resilience. The fuels specialist included an analysis on flame length and rate of spread to analyze for the effects of the project on fire behavior.

A result of the meeting on June 27, 2013 was the development of prescriptions (in alternative 2 - Figure 10) for each Riparian Reserve (including no treatment) by the hydrologist.

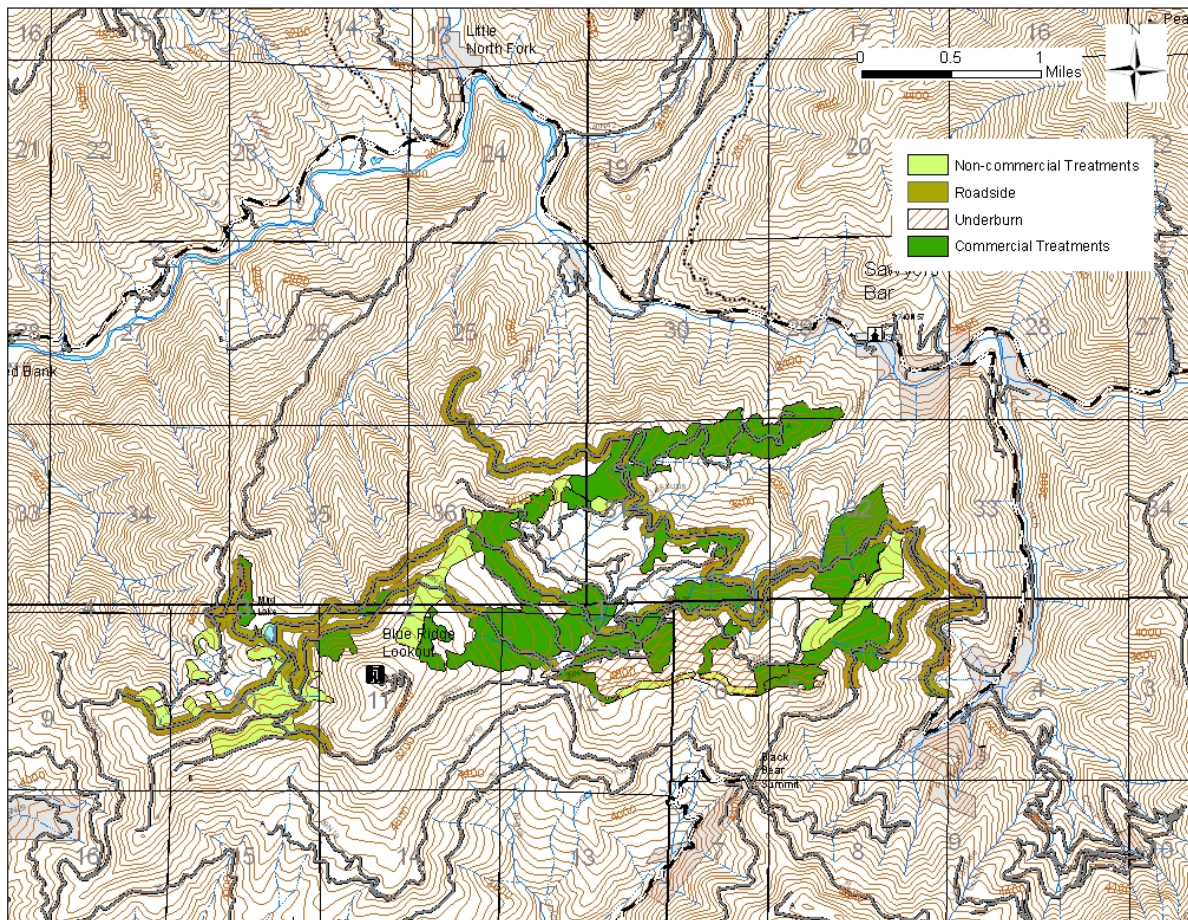


Figure 10. Alternative 2 of the Jess project, showing prescriptions.

The meeting on June 27, 2013 was immediately after the scoping period had ended for the Jess project. Many of the comments received during this meeting were also reflected in the scoping comments the Forest received. Alternative 3 was developed in response to the issues raised during scoping. The changes included removing units where treatment would remove or downgrade northern spotted owl habitat and removing treatments in the Riparian Reserves (Figure 11). Altering prescriptions to maintain suitable habitat was considered, but was not likely to achieve the desired degree of restoration because of density requirements.

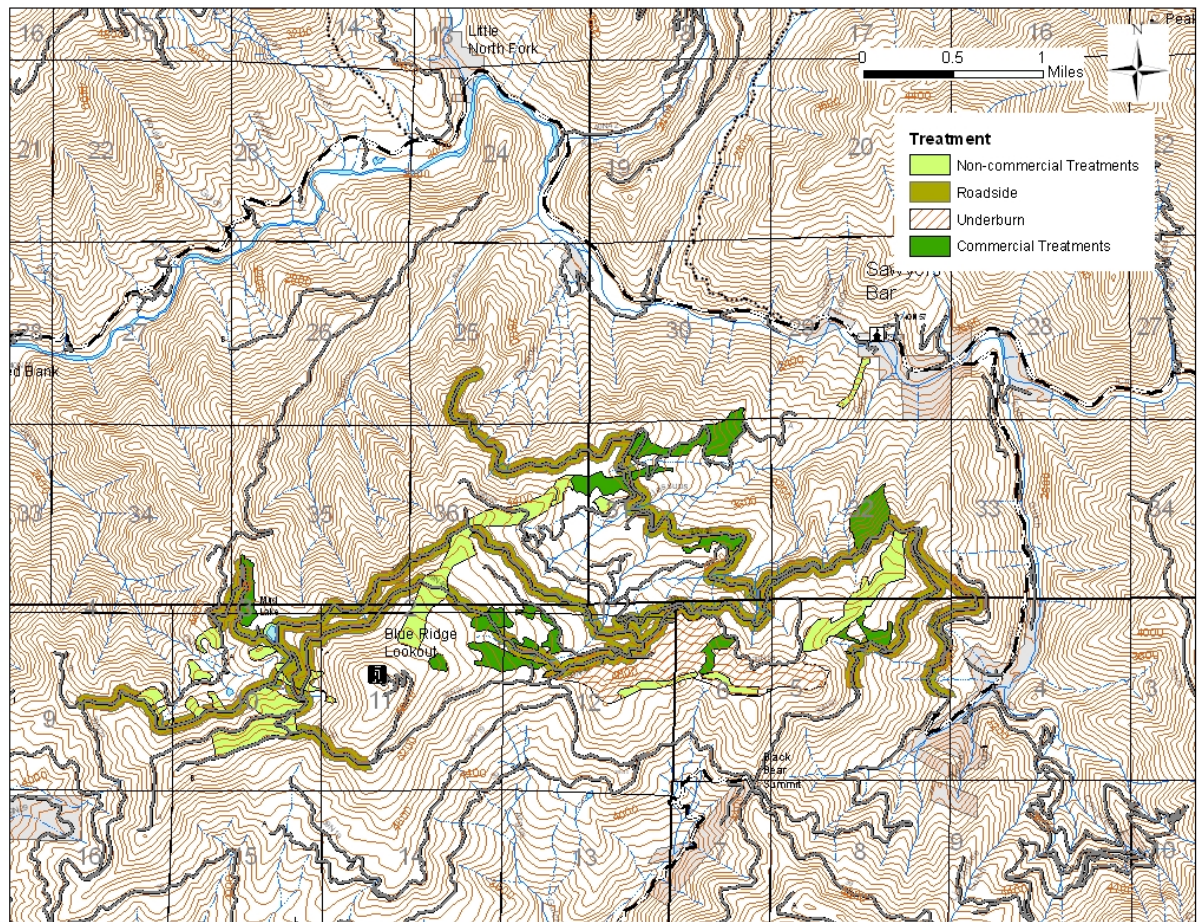


Figure 11. Alternative 3 for the Jess project developed in response to issues raised during the scoping process.

There were many comments regarding the retention of 60% canopy or greater and the retention of large trees to meet habitat needs and the recommendations in the CWPP. The discussion on large trees did not lead to a definite diameter that the group considered a large tree. Instead, the discussion led to the concept that there is a need to retain trees that have old-growth characteristics such as large limbs, thick bark, and deformities for habitat. The Forest considered an alternative that would retain greater than 60% canopy and would not remove any large trees. Only 47% of the units had 60% or greater canopy under inventory conditions. The finding of the interdisciplinary team was that the alternative would not put the project on a trajectory toward ecosystem restoration especially regarding the need to reduce the high mistletoe infection rates, create openings to allow regeneration of pine species or retain desirable species depending on site characteristics (i.e. hardwoods) in the project area. Since it did not meet the restoration concept, the alternative does not meet the purpose and need of the project.

The focus of the public meeting on February 5, 2014 was for the Forest to share the alternatives being analyzed and to discuss any remaining or unresolved concerns from collaborators. The concerns raised regarding the alternatives were the potential brush response in the commercial harvest units, the intention of the mistletoe treatments, effects

on bear grass and fuels treatment options. As a result the Forest added fuels treatments to all commercial harvest units to mitigate any potential fuels response. The road fuels treatments widths were clarified. They are 200 feet on either side of the road. The marking crew is getting training on which mistletoe infected trees are the most beneficial to wildlife and are considering potential damage to hardwoods while marking the units. The botanist completed additional analysis on the effects of the project on bear grass. The recommendation for changing the project to use multiple harvest entries, instead of one as is currently planned, was considered but eliminated from detailed study (see alternative D, Section 2.3). The Forest has Regional direction to implement projects with 20-30 year effectiveness. A project that requires multiple entries over a shorter period of time does not meet this guidance.

There was a public field trip offered on April 2, 2014 in response to requests made at the February 5, 2014 meeting. The purpose of the field trip was to look at the areas brought up as of concern during the February 5, 2014 meeting with the collaborators. Four commercial units were visited. The Forest considered all of the points of discussion and shared the responses with the collaborators on May 3, 2014. The discussion lead to an additional alternative considered but eliminated from detailed study (alternative E, Section 2.3).

Appendix F. Aquatic Conservation Strategy Objectives

The Forest Plan contains the components, objectives and standards and guidelines for consistency of projects with the Aquatic Conservation Strategy (ACS). The Record of Decision for the Forest Plan (USFS, 1995c) is the guiding document for Forest projects; the Forest ROD incorporates the Aquatic Conservation Strategy standards and guidelines from the ROD for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the northern spotted owl (commonly known as the Northwest Forest Plan) (USDA Forest Service and USDI Bureau of Land Management 1994b). The Forest Plan lists four components of the Aquatic Conservation Strategy, as stated on pages 4-25 through 4-27 of the Forest Plan: “1) Riparian Reserves, 2) Key Watersheds, 3) Watershed Analysis and 4) Watershed Restoration” (USDA Forest Service 1995). The Jess project addresses these components as follows:

Riparian Reserves: Some proposed activities in the Jess project will occur in Riparian Reserves. Proposed treatments in Riparian Reserves are developed to thin these areas (appendix B) and reduce fuels. Although the purpose of the Jess project is not to restore watersheds, treatment prescriptions for units within Riparian Reserves are developed with input from wildlife and fish specialists and earth scientists to insure that Best Management Practices from the Pacific Southwest Region Water Quality Management for Forested Lands in California: Best Management Practices and Water Quality Management Handbook are followed. Project-specific Best Management Practices (appendix D) and project design features (Table 5) are developed to reduce negative effects of the project and meet the requirement of the Forest Plan (p. 4-106) to prohibit and regulate activities in Riparian Reserves that can retard or prevent attainment of the Aquatic Conservation Strategy Objectives.

Key Watersheds: The Jess project is a Key Watershed so standards and guidelines related to key watersheds are addressed in this project.

Watershed Analysis: Initial watershed analysis was completed for the Jess area and is entitled Klamath National Forest North Fork Watershed Analysis (USDA Forest Service, 1995d); information from this analysis is used when locating and designing proposed activities for the Jess project. Recommendations from the watershed analysis related to the purpose and need of this project are considered in developing treatments, prescriptions and project design features.

Watershed Restoration: Watershed restoration, including fish passage improvement, removing and upgrading roads, and restoration of large trees in Riparian Reserves, is an ongoing program on the Forest but not part of the purpose and need for the Jess project. However, proposed treatments in the project contribute to watershed restoration, especially repairing the legacy sites. These include thinning of small trees in the plantations that currently exist in Riparian Reserves to encourage the growth of larger trees by reducing competition from small trees. These treatments will also reduce the amount of watershed degradation that can occur from a high intensity wildfire by changing vegetative condition classes to reduce the extent and intensity of wildfire. Legacy site repairs include getting rid of diversion potentials, installing rolling dips thereby reducing fills, upgrading culverts to pass 100-yr floods, and re-establishing a channel that has been diverted due to a road. Temporary roads used in the project will be

hydrologically restored after use. Alternatives for the project are evaluated to determine the effects to Riparian Reserves at the site, reach, and 7th and 5th field watershed scales in the short and long term to determine effects on water quality, and on anadromous fish and their habitat. Both stream-course Riparian Reserves and those on unstable and potentially unstable areas (unstable-lands Riparian Reserves) are included in the analysis and evaluation. The conclusions of these evaluations for each alternative are summarized, by Aquatic Conservation Strategy objective, as follows:

The earliest disturbance of the watershed condition in the North Fork Salmon River was mining in the 1850s. Commercial logging and associated road construction followed in the 1950s. Historically, the North Fork Salmon had frequent fires with a fire return interval of ten-25 years (Watershed Assessment, pg. 4-4). The recent wildfires contributing to the current watershed condition in the North Fork Salmon River 5th field watershed are the Hog fire (1977), the Yellow and Neilson fires (1987), the Specimen fire (2008) and the Salmon Complex (2013). However, there have been no large fires in the Jess project area in the last 100 years.

Alternative 2

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Watershed complexity, in the is analysis, takes into consideration effects to large wood recruitment, the distribution of large trees in Riparian Reserves, coarse woody debris on the hillslopes, and the drainage network.

Little quantitative data is available regarding the historic range of variability of large woody debris, coarse woody debris and large trees in the Riparian Reserves. Assumptions can be made considering the history of disturbance. The sources of large woody (in channel wood) and coarse woody (upslope downed wood) debris have been reduced from historical conditions by commercial harvest. In the past frequent wildfires would have contributed to well-distributed large woody and coarse woody debris by creating snags that eventually fall. Historic mapping circa 1940s (Weislander) shows that the project area had ridges that were pine dominated. These areas would have had large trees widely spaced on the ridges. The remaining area was mostly mixed conifer. There are stumps in the project area that indicate that large trees were well distributed throughout the project area even in the Riparian Reserves. The drainage network has been modified by mining, but the basic skeleton of the drainages were not altered. Ditches were cut into the hillslope, but most of them are abandoned once the large scale mining ceased by the 1930s and do not currently divert water.

The treatments in both the commercial and non-commercial units will increase the quadratic mean diameter of the stands by 10% over the next 30 years. This is due to the reduction in mistletoe infection rates. The treatments will move the vegetative community in treated areas closer to that which occurred historically with greater structural diversity, less homogeneous species composition and large trees. (Silvicultural section of DEIS and Silvicultural Report). In alternative 2, these treatments will occur and benefits will be seen in the outer 70 feet of the Riparian Reserves in the units. These changes, in turn would result in an improved trend for large woody debris recruitment in

the stream channels, coarse woody debris on the hill slopes and stream shading in the Riparian Reserve. There will be no treatment in the inner 100 feet of the Riparian Reserves which is the most important portion of the Riparian Reserve for large wood debris recruitment (Aquatic Resources Report). This exclusion of commercial and non-commercial treatment and project design features for prescribed burning will also prevent any removal of existing large woody debris in the stream channel (Aquatic Resources Report). There will be no substantial effect to peak flows or debris flow potential as a result of the project. So the potential transport of large woody debris to the North Fork Salmon River will be maintained. There is currently an average of 5.6 logs per acre of coarse woody debris in the project area with values ranging between 0.8 to 13.6 logs per acre (Soils Report). This is not expected to change due to the project design features for both commercial treatments and prescribed fire requiring existing coarse woody debris remain untouched where possible (Soils Report). The commercial, non-commercial and prescribed fire treatments will not impact the drainage network in the project area. The legacy site repairs include addressing the diversion potential at road crossings and cross-drain locations. This will further reduce any potential impacts to the drainage network from capture of the streams by roadbeds. One legacy site is a modification of a stream alignment. The project includes the realignment of the water back into its original drainage feature (Aquatic Resources Report and Hydrology Report). At the project scale, alternative 2 will maintain and restore watershed complexity in the short and long-term. Alternative 2 will not prevent the attainment of this objective at the 5th field scale in the short-term. It will also contribute to the long-term improvement of watershed complexity including coarse woody debris, large woody debris, large trees and drainage network at the 5th field watershed scale.

Maintain and restore spatial and temporal connectivity within and between watersheds Lateral longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic- and riparian-dependent species.

Watershed Connectivity, for this analysis, takes into consideration the effects to aquatic species, fish, and riparian dependent terrestrial species passage in the project area and connectivity with the larger 5th field watershed.

Watershed connectivity would have ranged from high to impaired on any given section of the North Fork Salmon River and its tributaries. Landslide producing storms occurred about every ten years in the Klamath Mountains. So at any given time there would have been a percentage of stream channels recovering from debris flow and landslide impacts that would have scoured channels and stripped vegetation from the riparian. Small fires and blow-down would have left small openings in the canopy of Riparian Reserves as well. These impacts would have been smaller and better distributed in the watershed than they are today. Past road construction and clear cutting have increased the likelihood and consequence of some landslides and debris flows in portions of the watersheds. The recent wildfires in the North Fork Salmon River have been large and impacted entire 7th field watersheds (Watershed Assessment, pp. 4-8:9).

Alternative 2 will maintain and restore spatial and temporal connectivity within and between watersheds by maintaining a heterogeneous species composition as well as encouraging large tree development. In the short- and long-term, alternative 2 will not result in any physical or chemical condition that would hinder or prevent the upstream or downstream movements of fish and other aquatic organisms or the migration routes for wildlife species. Potential direct and indirect impact to aquatic resources will primarily occur as a result of water drafting. Effects will be localized, insignificant, and short-term. Other than water drafting, project components are either located in the uplands outside the Riparian Reserve, else adjacent to fishless streams far from fish-occupied waters. The use of resource protection measures/BMPs, along with distance, will mitigate the short-term impact to aquatic resources from non-drafting project elements to non-detectability from background processes, and therefore can be discounted. At the project scale, in the long-term alternative 2 will improve migration routes for wildlife by opening up dense stands to restore the greater connectivity that was historically present in these watersheds. Alternative 2 will not prevent the attainment of this objective in the short-term and will contribute to the long-term improvement of watershed connectivity at the 5th field scale.

Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Aquatic Systems Integrity, in this analysis, will consider effects to the channel geomorphology and include evaluations of road density, hydrology connectivity of road system and direct impact to bank and stream bottom.

Naturally the banks, shorelines and stream bottoms would have been varied and heterogeneous. At the site scale a downed tree or small landslide could have impacted banks, shores and bottom configurations and debris flows would have impacted these features along miles of stream channel at a time. However, there would have been a high percentage of streams with competent, overhanging banks, regularly inundated shorelines and stream bottoms with complex in-channel landforms and varied substrates.

The only direct disturbance to stream channels that could occur due to the project would be skidding logs at a designated location across one intermittent stream channel when it is dry in unit 118. This action will have only minor short-term effects on the physical integrity of stream channels because such skidding will be restricted to designated locations where little disturbance to the stream channel will result and where channel morphology can be easily restored, and before flows resume the following wet season. This generally consists of removing excess soil, reshaping and waterbarring former approaches, and spreading slash on the former crossing. The road density in alternative 2 will go from 2.71 miles/miles² to 2.37 miles/miles² in the Jessups Gulch 7th field watershed (Water Quality section of DEIS). There will be a reduction of hydrologic connectivity of the roads at stream crossings and cross-drain locations as a result of addressing diversion potential on the roads. In the short-term and long-term, alternative 2 will meet this objective because any direct or indirect disturbances from project activities will not cause permanent measurable change in channel geomorphology at the project or 5th field watershed scale. Alternative 2, in the long-term, will contribute to the improvement of aquatic systems integrity at the 5th field watershed scale and not prevent the attainment of this objective in the short-term.

Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction and migration of individuals composing aquatic and riparian communities.

As a tributary to the Klamath River, The North Fork Salmon River is listed in the 303 (d) Clean Water Act for stream temperature impairment (Hydrology Report and Water Quality section of DEIS). The water quality analysis for this project will focus on stream shade as a proxy for temperature of the stream.

Several streams in the North Fork Salmon 5th field watershed were monitored for shade with results described in the Stream Shade Monitoring on the Klamath National Forest 2010 (USDA, USFS, 2011). The monitoring estimated potential shade for each stream and compared it to the modeled existing shade on the stream. Five of the six streams monitored were under their potential shade. The streams with reduced shade were all within 3% of their potential shade. Crapo Creek was the only site monitored that was at or above potential shade along stream channels.

Alternative 2 has large buffers and canopy retention guidelines for treatments in the Riparian Reserves that will retain current shade on the perennial and late-flowing intermittent stream channels (Hydrology Report and Water Quality section of DEIS). Since no shade providing trees will be removed, the alternative will not affect temperatures in the Jess project area. The increased defensibility against wildfires in the project area will mean that should a wildfire occur the disturbance will be limited and the stands treated in alternative 2 will be more resilient to wildfire (Silviculture section of DEIS) which includes the outer 70 feet of the Riparian Reserve. There will be no measureable change in the short-term on temperature at the project or 5th field watershed scale. The benefits of larger trees, increase defensibility against wildfire and improved resilience of forest will be seen in the long-term at the confluence of the North Fork Salmon River and Jessups Gulch, Shiltos Creek, Eddy Creek and Jones Gulch. These tributaries provide cold water refugia to Chinook and Steelhead/rainbow trout in the North Fork Salmon River. Alternative 2 will contribute to the improvement of water quality at the 5th field watershed scale in the long-term.

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage and transport.

The sediment regime analysis will consider the effects to sediment delivery to streams estimated by the Universal Soil Loss Equation and landslide models (Hydrology Report and Geology Report).

The Cumulative Watershed Effects modeling shows a background landside potential of 233,000 cubic yards per decade of sediment delivered to streams under pre-disturbance conditions for the North Fork Salmon 5th field watershed. The background soil erosion related sediment delivery to streams is estimated at 4,500 cubic yards per year. The current landslide potential is about 513,000 cubic yards per decade and soil erosion sediment delivery is estimated at 8,300 cubic yards per year. This leads to a risk ratio for landsliding of 0.60 and a soil erosion risk ratio of 0.21. Seventh field watershed estimates

can be found for the project area in appendix A of the Hydrology Report. In general, the background landslide potential ranges from 7,350 to 18,650 cubic yards per decade for the project area. The current risk ratios for landsliding range from 0.51 to 1.73. The elevated risk ratio is in Olsen Creek which is a compound watershed that straddles the North Fork Salmon River into the area affected by the 2013 Salmon Complex Fire. The background sediment delivery to streams from soil erosion ranges from 81 to 246 cubic yards per year. The current risk ratios range from 0.36 to 0.96.

In the short-term, there may be minor negative effects to sediment movement related to ground disturbing actions such as timber harvest, fuels reduction, and actions within stream channels such as road crossing upgrades, water drafting, and crossing dry channels with equipment at designated locations. These actions could affect sedimentation, and/or channel geomorphology at the site-scale but not more than 300 feet downstream (for water drafting which is the only action to occur in live stream. The estimated landslide potential would be increased by 8% in Jessups Gulch over current conditions. The other 7th field watersheds have an estimated increase of landslide potential of less than 0.6%. The sediment delivery from soil erosion is estimated to increase by about 10% in Jessups Gulch and by less than 1% in the remaining 7th field watersheds. The estimates of soil erosion and landslide potential do not account for the project design features intended to meet Best Management Practices. Best Management Practices have been shown to have a 94% effectiveness rate in preventing sediment from being delivered to a stream (Hydrology Report). The closest fish bearing streams or fish habitat is more than 1.6 miles downstream of the nearest treatment proposed in alternative 2. This distance along with the small amount of sediment increase expected means that there will be no measurable effect to fish or fish habitat (Aquatic Resources Report) at the project scale, and therefore at the 5th field watershed scale.

Adding the effects of the North Fork Salmon River Stormproofing project and the repairing of legacy sites, the effects of alternative 2 will contribute to the improvement of the sediment regime in the North Fork Salmon River 5th field watershed in the long-term.

Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats, and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

The water quantity analysis considers the effect to base flow using a qualitative assessment and peak flow using the Equivalent Roaded Acres model.

The historical range of variability for base and peak flow falls from 100 year flood events like the flood of 1964-1965 to drought years where the snow pack is less than 10% of normal in some areas. The spring-fed perennial streams have less variation in their base flows than snow-melt driven intermittent streams from year to year. Large fires can increase peak flows because of the reduction in precipitation interception and roughness that slow the water on the hillslope. There are no active diversions in the project area. Jessups Gulch is the municipal watershed for the community of Sawyers Bar. So water is removed at the mouth of Jessups Gulch treated and distributed throughout the community.

There will be no watershed-scale changes to peak/base flows from alternative 2 due to the upslope position, localized impacts, and functioning buffering capacity of intervening Riparian Reserve habitat. This is reflected in ERA model output, which remains below the threshold of concern. At the site scale, in-stream flows would only be affected by project related water drafting. At all project drafting sites, pumping rate will not exceed 350 gallons per minute or 10% of the flow of any anadromous stream and pumping is done in short periods. Water drafting will result in only slight temporary decreases in flow, which will be undetectable both a short distance downstream and further downstream in Coho Critical Habitat. Base and peak flows are not measurably affected at the project scale, and therefore there is no effect at the 5th field watershed scale. Alternative 2 will not prevent the attainment of this objective on either the short or long-term.

Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

The flow regime analysis will consider effects to the potential inundation of the North Fork Salmon River floodplain.

Floodplain inundation is a natural process that recharges groundwater and at high flows can naturally increase watershed complexity by modifying stream banks and gravel bars. Mining along the North Fork Salmon River has modified the floodplain by removing river terraces and leaving behind steep headcut banks and piles of tailings. Portions of the floodplain should be inundated every year or two with flood years filling the floodplain with slow moving water the entire width of the valley.

Peak flows in the tributaries to North Fork Salmon River that contribute to floodplain inundation will remain unchanged in the short- and long-term (see Water Quantity analysis above). Alternative 2 will have no effect on floodplain inundation and will not prevent the attainment of this objective.

Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

This analysis will consider the expected response of conifer and hardwood trees in the Riparian Reserves including species diversity and structural components.

Historically, much of the area was pine dominated, both by ponderosa and sugar pine, with sugar pine being the dominant species. Some stands were also historically Douglas-fir dominated. White fir now occupies the majority position primarily due to past partial cutting practices and exclusion of natural wild fires. Mistletoe was overall at an endemic infection rate. Dwarf mistletoe is a host specific parasitic seed plant. Evidence of mistletoe infection was found in the major conifer species that are present in the project area (Douglas-fir, white fir, incense cedar, ponderosa pine, sugar pine and red fir) indicating that several different dwarf mistletoe species are present in epidemic rates (see Table 1 in DEIS) (USDA Forest Service, 2013).

Treatments under alternative 2 will move species composition and structural diversity of plant communities toward greater structural diversity and less homogeneous species composition at the site scale in the short-term and long-term. . Species composition will increase over the long-term due to the retention of historically dominate species and by planting rust-resistant sugar pine (Silviculture Report). The prescriptions are aimed at retaining hardwoods and restoring hardwood systems (Silviculture Report). The treatments would move communities within the treated stands toward a species mix that occurred prior to fire suppression and timber harvest, restoring the diversity and productivity of the riparian vegetation community. Forest Vegetation Simulator modeling predicts mistletoe infections across all infected stands will be reduced following treatments in the proposed action. Overall, an average of 54% reduction in Douglas-fir infections and 73% reduction in white fir infections are predicted at the end of the 30 year modeling period. This would increase forest health and resiliency to disturbances by moving the project area toward endemic infection levels. With a reduction in stand density, there is less competition for resources, resulting in increased growth and vigor of the trees that remain. Removal of severely mistletoe infected trees in the overstory will reduce the spread of infection to uninfected trees. Removal of trees from these stands also results in removal of ground fuels that would otherwise accumulate. These changes, in turn would result in an improved trend for large woody recruitment, stream shading and other key riparian system processes. Alternative 2 will contribute to the improvement of species and structural diversity at the 5th field watershed scale in the long-term and will not prevent the attainment of the objective in the short-term.

Maintain and restore well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

This analysis will consider the effect to the vegetation in the Riparian Reserves and the risk of the spread of noxious weeds.

The historical mining and logging activities have led to a modification of Riparian Reserve vegetation. Historically, it was likely a mix of willow and alder in streams that have recently experienced debris flows grading in to large conifers in the old-growth forest. Noxious weeds were not present before they were introduced by humans either intentionally or unintentionally.

Treatments will help accelerate the recovery of these stream course Riparian Reserves at the site scale in the short-term and long-term by increasing plant species diversity and vegetative heterogeneity (see Species and Structural Diversity Objective above).

Treatments within Riparian Reserves would move the riparian community toward a more historic composition, providing the opportunity for riparian-dependent flora and fauna to be well-distributed within the project area and watershed. In both plantations and natural stands, treatments will result an increase in available water, nutrients, and sunlight available for improving the growth, resilience, and vigor of trees in the Riparian Reserves. Alternative 2 has a low risk of weed introduction or spread (Non-native Invasive Species section of the DEIS). Alternative 2 will not prevent the attainment of the objective in the short-term at the project or 5th field scale. The alternative will contribute to the improvement of distribution of native species in the Riparian Reserves at the 5th field scale in the long-term.

Alternative 3

All of the objectives are similar to those of alternative 2 except Complexity of Watershed, Sediment Regime and Species Composition and Structural Diversity. The differences are described below.

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

The difference from alternative 2 is that the commercial and non-commercial units will increase the quadratic mean diameter by only 2.8% compared to 10% in alternative 2 over the next 30 years. This means fewer large trees than in alternative 2 because of the reduction in acres treated in alternative 3. Since there are no commercial treatments in the Riparian Reserves, none of the benefit of the treatments will be gained in the Riparian Reserves.

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage and transport.

The difference from alternative 2 is a reduction in the sediment estimated to be delivered to the stream channel from soil erosion and landsliding. The increase in sediment delivered to the stream from landsliding is estimated to be less than 2% compared to 8% in alternative 2. The increase in sediment delivery from soil erosion is about 7% compared to 10% in alternative 2. The project has a reduced sediment delivery rate because it treats fewer acres than alternative 2.

Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

The difference between alternatives 2 and 3 is that alternative 3 will have a 103% and 764% increase in mistletoe infection rates (in Douglas-fir and white fir, respectively) in alternative 3 compared to a reduction in mistletoe infection in alternative 2. There is no commercial treatment in Riparian Reserves which means that the benefit to species diversity gained by commercial treatment will not occur in the Riparian Reserves.

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Appendix G. Disposition of Scoping Comments

Introduction

Scoping efforts for the Jess project are summarized in Section 1.7 of this DEIS.

The comments received as a result of public scoping are summarized and addressed below. Literature cited that is associated with a project-specific comment and that was provided to the Forest by the commenter is addressed in this disposition of comments. A request for information regarding how literature cited by commenters is related to a project-specific comment, and for literature that was not provided to the Forest, was made to George Sexton and Kimberly Baker on January 17, 2014. No response to this request was received so this literature is not addressed in this disposition.

Method of Scoping Comments Analysis

As a result of scoping, the Forest Service received five letters from interested and affected parties and agencies, as shown in Table below.

Issues are defined as points of discussion, dispute, or debate about the environmental effects of proposed actions.

Comments have been categorized as follows:

1. **Relevant Issue.** These issues were defined as concerns about effects that may directly or indirectly be caused by implementing the proposed action. Relevant issues were resolved through new alternative or project design feature development.
2. **Other Issue.** An issue may not be relevant for any of the following reasons:
 - a. The issue is outside the scope of the proposed action, and is not related to the decision to be made.
 - b. The issue is a procedural concern, which is already decided by law, regulation, policy, or direction (Forest Plan).
 - c. The issue is a procedural concern, which was addressed through project design or was/will be addressed through analysis.
 - d. The issue is not supported by scientific (or factual) evidence.
3. **Concern.** These are general comments or questions that do not meet the definition of an issue as stated above.

Table 26. Interested and affected parties and agencies that submitted comments during the scoping period for the Jess project.

Commenter #	Commenter
1	Thomas Williams, North Coast Regional Water Quality Control Board, 5550 Skylane Blvd., Suite A, Santa Rosa, CA 95403
2	James Munson, Environmental Protection Agency, Region IX, 75 Hawthorne Street, San Francisco, CA 94105
3	Richard Svlich, American Forest Resource Council, 104 N. Dewitt Way, Yreka, CA 96097
4	Steven Brink, CalForests, 1215 K Street, Suite 1830, Sacramento, CA 95814
5	Kimberly Baker, Klamath Forest Alliance, PO Box 21, Orleans, CA 95556; George Sexton, Klamath Siskiyou Wildlands Center, P.O. Box 102, Ashland, OR 97520; and Andrew Orahoske, Environmental Protection Information Center, 145 G. St., Suite A, Arcata, CA 95521

Table 27. Scoping comments and disposition of comments by subject category.

(1) Concern: The project must incorporate Best Management Practices (BMPs) and comply with the Clean Water Act, California's Porter-Cologne Act, the North Coast Basin Plan, applicable Total Maximum Daily Loads, and the 2010 Waiver Conditions.

Commenter # - Comment #	Comment
1-1	The Basin Plan contains water quality objectives, implementation plans for meeting those objectives, and other policies, including State Water Resources Control Board and federal policies, which are applicable to operations on National Forest System lands within California. The KNF Jess Project must be designed and implemented to meet the water quality standards outlined in the Basin Plan. Additionally, the project must be in compliance with any total maximum daily load (TMDL) that has been developed for the watersheds in which the project will occur.
1-2	For project enrollment, the 2010 Waiver states that after the Project Decision Notice is signed and at least 30 days prior to commencement of on-the-ground activities, a Notice of Intent (NOI) and Waiver Application shall be filed with the Regional Water Board. The NOI certifies that the USFS understands and intends to comply with the Waiver. A letter granting coverage must be received prior to initiating activities.

Commenter # - Comment #	Comment
1-3	<p>General Condition #3 (page 14) states that:</p> <p>“USFS shall assess watershed conditions and propose and implement restoration activities to address identified water quality concerns. Individual projects under Category B must inventory, prioritize, and schedule for treatments of existing legacy sediment sites as part of the proposed project activities when an inventory and prioritization of legacy sites has not been initiated as part of a larger watershed planning effort in the project area as defined in the project description. Multiple Forest, Forest-wide, or multi-district activities, such as wildfire reforestation, recreational site improvement, road maintenance, prescribed burns, powerline right-of-way maintenance, and grazing allotments, are exempt from this requirement.” This condition requires the USFS to inventory, prioritize, and schedule for treatment existing legacy sediment sites that are in the project area as part of the proposed project, or identify the existing larger watershed planning effort (e.g. Watershed Analysis and Restoration) that will accomplish the same.</p>
1-4	<p>To provide clarity, transparency, and improve our ability to assess compliance with water quality objectives, General Condition #10 (page 15) states: “USFS shall include within the environmental document prepared pursuant to NEPA, contracts, grazing permits, agreements, and other instruments used to direct the activities of contractors, grazing permittees, USFS personnel, or volunteers, or any other third parties specified in this Waiver, the specific on-the-ground prescriptions that are designed to meet the USFS BMPs.”</p>
1-5	<p>General Condition #11 (page 15) states that:</p> <p>“In addition to providing specific on-the-ground prescriptions, the USFS shall provide copies of this Waiver to contractors and grazing permittees, and USFS volunteers or any other third parties specified in this Waiver, and notify them of their responsibilities to comply with the Waiver.”</p>
1-6	<p>Condition #1 [Page 13) states that:</p> <p>“USFS shall manage and maintain designated riparian zones to ensure retention of adequate vegetative cover that results in natural shade conditions within 300 feet slope distance on each side of fish-bearing streams, 150 feet slope distance on each side of perennial streams, and 100 feet slope distance on each side of ephemeral/intermittent streams, or the site potential tree height distance on each side of the stream, whichever is greatest. Timely implementation is necessary for sediment and temperature TMDL compliance. Natural shade conditions are defined as the shade on a watercourse that results from the site potential naturally occurring vegetative community and topographic configuration. Exceptions to this condition will be considered. In order for Regional Water Board staff to determine the adequacy of the justification for an exception, the justification must identify the proposed canopy reduction and expected recovery time, provide an estimate of the pre- and post- project shade or solar impacts, and explain how such an exception will result in a net long-term benefit to water quality and stream temperatures.”</p>

Commenter # - Comment #	Comment
1-7	Measures to mitigate water quality impacts should be included in the design of the KNF Jess Project. The 2010 Waiver Application requirements (page 23, item “g”) states that an application must contain: “Copies of relevant portions of all environmental documents that set out the details of a project, especially on-the-ground prescriptions, including supporting documents that describe in detail the activities and management practices that will be taken to reduce potential water quality impacts to less than significant levels (e.g., NEPA documents, technical reports, design criteria, assessments, watershed restoration plans).”
1-8	The Waiver Monitoring and Reporting Program (Page 2, USFS-Wide Monitoring, Administrative Implementation Monitoring) states: “All projects in Waiver Category B will have administrative implementation monitoring using a “checklist” approach. All on-the-ground prescriptions for the project must be included in the checklist so that the monitoring constitutes 100% implementation monitoring.”
2-6	EPA urges the Forest service to engage the North Coast Regional Water Quality Control Board staff early in the process of Project design and development of the DEIS to ensure that Project operations will be in compliance with the North Coast Basin Plan, California’s Porter-Cologne Act, the federal Clean Water Act, and the final Total Maximum Daily Loads (TMDLs) for streams in the Klamath Watershed. We recommend the DEIS include a description inventory of stream crossings such as culverts, bridges and low water crossings that could be impacted by the Project. We recommend that fuel hazard reduction and restoration projects in the Klamath National Forest include systematic monitoring, data collection, and analysis necessary to estimate fine sediment and nutrient load contributions to potentially affected streams. We also recommend the DEIS include a Best Management Plan (BMPs) that will help to reduce water quality impairment.

USFS Disposition: This is a Concern [3] that does not meet the definition of an issue. How the project complies with laws, policy, and regulations is disclosed in the draft environmental impact statement (DEIS) for each resource (specifically sections 3.7.5, 3.9.5, and 3.10.5) and in applicable resource reports (especially the Hydrology, Geology and Soils Reports). More than 40 project design features (DEIS, section 2.2.4 Table 5) such as the stream-course Riparian Reserve buffers (DEIS, Table 21) are designed to minimize the impacts to water quality and to comply with the Basin Plan. Unit specific prescriptions for the Riparian Reserve were recommended based upon current shade measurements, riparian health, and fuel load. There will be no shade reduction to any streams from project implementation. A Notice of Intent and Waiver Application will be sent to the Regional Water Board after the Record of Decision (ROD) is signed. As part of the Waiver Application, a checklist of all Best Management Practices and project design features will be attached. The checklist will be given to contractors and used by Forest Service officials to ensure compliance. Legacy sites within the project were identified and will be remediated as part of the project to comply with waiver requirements; remediating the sites will ensure compliance with both sediment and temperature requirements of Total Maximum Daily Loads. The project will be part of a

sampling pool for monitoring implementation of Best Management Practices and project design features as part of the Forest Best Management Practices Evaluation Program (BMPEP).

(2) Other Issue: Logging will degrade natural resources, impact habitat, inhibit the development of late-successional characteristics, reduce forest diversity, degrade soil productivity, and increase mistletoe infection rates.

Commenter # - Comment #	Comment
2-2	The proposed project includes thinning and timber harvest on ridge tops, roadways and meadows. While we understand the need for fuel reduction, we are concerned that some of the commercial timber harvest aspects of the project could be non-sustainable practices that will result in the future degradation of natural resources and habitat fragmentation.
5-7	The forest stands proposed for logging, particularly the large fire-resilient trees proposed for extraction, are currently already contributing to the compositional, structural, and functional attributes of biologically diverse forest ecosystems. You cannot restore ecological processes by removing the very components contributing to forest structure, function and composition.
5-8	Logging may exacerbate the spread of mistletoe and will not control this very natural and permanent element of healthy forest stands.
5-63	The peer-reviewed report finds that the ecological costs of extensive thinning and other treatments are virtually inevitable: first, because many proposed projects necessarily involve repeated entries into the same area, which raises the scale of cumulative effects and effective level of disturbance; second, because the treatments cause direct impacts (e.g., they damage soils, cause erosion, disrupt streamflows, and damage riparian areas); and third, because the treatments fail to address the actual dominant causes of watershed degradation, such as road building. Combined, these factors can impede or set back ecologically sound efforts at aquatic ecosystem restoration.
5-67	We are very concerned that the proposed action will not improve, and may well worsen, some of the problematic resource conditions resulting from intensive logging which has been documented, including fragmentation of forest habitat, soil damage, and a paucity of mature and late-successional trees and forest and associated habitat.

Disposition: This is an Issue [2c] that is addressed through project design and analysis. The analysis and disclosure of environmental effects of the proposed action and alternatives are summarized in section 2.5 of the DEIS, and addressed in more detail in relevant sections of chapter 3 and resource reports. For example, the DEIS addresses possible impacts of logging activities to soil functions on main skid trails and landings (DEIS, section 3.9.4). However, the relative amount of soil damage in relation to the total treatment area is minor and is reduced to the extent possible with project design features (DEIS, section 3.9.4 and Soils Report).

(3) Other Issue: The removal of canopy will remove forest habitat, increase the risk of fire, modify microclimates, and impact northern spotted owl and goshawk habitat.

Commenter # - Comment #	Comment
5-4	Our organizations would be willing to work with the Klamath National Forest towards accomplishing fuels reduction, forest health and fire resiliency objectives in a way that retains forest values. Hence we are extremely disheartened that the Jess project targets fire-resilient stands with north-facing aspects, wildlife mistletoe trees, and the overstory canopy of native forests. It is our understanding that the agency's proposal contains no substantive protection for large fire-resilient trees and allows for extreme canopy cover reduction down to 15% on ridges, 15% on upper slopes, and as low as 30% canopy cover in the middle third of slopes. Such low canopy covers do not actually qualify as "forests" or "forested habitats" in our opinion.
5-5	Rather than acknowledging, incorporating or discussing our clear and upfront comments the District with a business as usual approach intends to double-down on the mistakes of the past, perpetuating confrontation and ignoring the best available science, by proposing to drastically remove canopy, logging in Riparian Reserves and in stands deemed to be critical to the survival and recovery of the threatened Northern Spotted Owl, containing mistletoe that currently provide valuable wildlife habitat.
5-6	Simply stated, as further detailed in these comments below, there is near zero need to manage "fuel loading" as shown from the agencies own fuel/fire models. Further logging large diameter trees and drastically removing canopy as proposed will likely increase the risk of fire in the short and long term.
5-10	Please provide us with the science used to justify the proposal to nearly eliminating all canopy from the ridgetops and the upper 1/3 slopes.
5-11	Common sense and science clearly indicate that surface fuels need treatment not removal of 85% of the overstory. By taking away the canopy and shade overstory brush and ground fuels will flourish. Who in the "collaborative group" recommended this? The Salmon River CWPP calls for at least 60% retention of canopy. The forthcoming NEPA must detail the reasoning for proposing to eliminate the canopy and creating brush fields. The majority of these slopes are north and east facing which historically and naturally more dense with cooler microclimates resulting in less fire prone conditions. In a landscape as topographically complex as the project area, fire severity will be influenced greatly by topography.
5-45	We would like to reiterate a 60--80 percent canopy closure is vital for the goshawk and keeps out competitors.
5-87	We continue to recommend at least 80% canopy cover on northerly slopes and at least 60% canopy on southerly slopes, as reasoned by science provided in these comments. Canopy and slope directly relate to amount of sunlight, ground fuel response, wind, blow down potential, rain on snow events potential and moisture within stands.
5-88	In our pre-scoping comments we asked the agency to work with stakeholders to agree and discuss marking guidelines to be included in the DEIS.
5-12	Our organizations strongly recommend keeping canopy above 80% on north and east facing slopes and the use of shaded fuelbreaks as opposed to 15% canopy retention along ridgelines as discussed below.

USFS Disposition: This is an Other Issue regarding a procedural concern [2c]. The project is not reducing canopy on ridgetops to modify fire behavior. The project activity will reduce canopy for stand health and tree resilience (see Silviculture Report). There is little need for immediate fuels treatment. However, future trends as shown in modeling express the need for treatment into the future. The forest reviewed [Agee and Skinner 2005, Taylor and Skinner 1998, Ingalsbee 2005] literature and agree with the use of prescribed fire and shaded fuel breaks. The project will use prescribed fire and shaded fuel breaks to achieve desired condition. (see Fire and Fuels Report).

(4) Other Issue: The removal of large fire-resilient trees and opening up the canopy will not modify fire behavior and can impact aquatic systems and watershed function.

Commenter # - Comment #	Comment
5-61	Mechanical removal has proven to have serious negative effects on the landscape. A recent study entitled "The Watershed Impacts of Forest Treatments to Reduce Fuels and Modify Fire Behavior," authored by independent hydrologist Jonathan J. Rhodes, raises serious questions about the ecological efficacy of forest thinning and other mechanical fuel treatments intended to control wildfires – primarily because of their unintended but inevitable damage to forested watersheds.
5-62	The impacts of mechanical fuel treatments on watersheds are especially of concern because aquatic systems are significantly and pervasively degraded. In some instances fuel treatments actually work against watershed restoration needs because of the practices involved and the diversion of resources away from beneficial restoration activities, such as road upgrading and removal.
5-76	Importantly, canopy bulk density was not strongly correlated to fire severity. Instead, height to live crown, the variable that determines crown fire initiation rather than propagation, had the strongest correlation to fire severity in the areas we sampled. They also found the more common stand descriptors of stand density and basal area to be important factors. But especially crucial are variables that determine tree resistance to fire damage, such as diameter and height. Thus, "fuel treatments" that reduce basal area or density from above (i.e., removal of the largest stems) will be ineffective within the context of wildfire management.
5-78	While our organizations generally support thinning small-diameter trees in the project area, particularly near homes and communities, it is critical to recognize that widespread logging may not influence fire and fuel hazard in the manner that the Forest Service predicts. Hence we urge the agency to proceed with caution and avoid excessive damage to forest resources from harmful practices like road construction, tractor yarding, and yarding through riparian reserves.
5-75	While we recognized (and encourage) the thinning of ground fuels and ladder fuels, we are not convinced that removing large-diameter trees from the forest canopy will achieve the desired reduction in fuel hazard.

Commenter # - Comment #	Comment
5-109	Fire behavior and severity depend on fuel properties and their spatial arrangement. Fuel bed structure plays a key role in fire ignition and spread, and is central to developing an effective fuel management strategy (Graham et al. 2004). The bulk density (weight within a given volume) of surface fuels consisting of grasses, shrubs, litter and dead woody material in contact with the ground are critical frontal surface fire behavior (heat output and spread rate - intensity) compared to simple fuel loading (weight per unit area) (Sandberg et al. 2001). High surface fire intensity usually increases the likelihood of overstory canopy ignition and torching (Scott and Reinhardt 2001).
5-110	The shrub and small tree fuel stratum also is important to crown fire ignition because it supports surface fire intensity and serves as ladder fuel that facilitates vertical movement of fire from the ground surface into the canopy. The size of the gap between the ground and tree canopies is critical to ignition of crown fire from a surface fire (Id., Graham et al. 2004). Van Wagner (1977) reports that crown fires are ignited after a surface fire reaches critical fire line intensity relative to the height of the base of aerial fuels in the crown. This crown ignition can become a running crown fire if its spread rate surpasses a certain canopy density threshold. Agee (1996) suggests a canopy bulk density threshold of 0.1 kg/ha as a general determinant for crown fire activity under extreme weather conditions. However, Keyes and O'Hara (2002) note the incompatibility of such open forest conditions with key forest management objectives including wildlife conservation and prevention of understory initiation and ladder fuel development, especially in the absence of an institutional commitment to stand maintenance.
5-111	Omi and Martinson (2002) sampled wildfire areas to describe the effectiveness of fuel treatments on subsequent fire severity. The strongest correlation they found was that between crown base height and "stand damage," which they used as a measure of severity. Importantly, canopy bulk density was not strongly correlated to fire severity. Instead, height to live crown, the variable that determines crown fire initiation rather than propagation, had the strongest correlation to fire severity in the areas we sampled. They also found the more common stand descriptors of stand density and basal area to be important factors. But especially crucial are variables that determine tree resistance to fire damage, such as diameter and height. Thus, "fuel treatments" that reduce basal area or density from above (i.e., removal of the largest stems) will be ineffective within the context of wildfire management.

USFS Disposition: This is an Other Issue regarding a procedural concern [2c]. The impacts of fuels treatments to aquatic systems and watershed function have been analyzed in the Water Quality Report. Fuels treatments such as mastication, manual thinning, handpiling, and prescribed fire will be utilized to modify fire behavior. Fuels treatments do not call for the removal of large trees.

(5) Other Issue. Mechanical thinning can lead to an incidental take permit to harass, harm or kill species listed as threatened or endangered under the Endangered Species Act.

Commenter # - Comment #	Comment
5-86	Mechanical thinning proposals advanced by federal foresters routinely require incidental take permits to harass, harm or kill species listed as threatened under the Endangered Species Act.

USFS Disposition: This is an Other Issue because it is already decided by law, policy and regulation [2a]. The Forest is working with the USFWS to minimize impacts through consultation and project design features. With the use of surveys and limited operating periods potential actions that could harass, harm, or kill a listed species will be minimized. The USFWS will submit a Biological Opinion verifying these mitigations.

(6) Other Issue: Mechanical thinning can remove large trees that are disease and fire resistant, increase mortality of residual trees due to damage, damage soil integrity, create sediment pulses in the streams, reduce habitat for cavity nesting and woody debris dependent species, and reduce habitat quality for Sensitive Species.

Commenter # - Comment #	Comment
5-115	<p>Scientific understanding of the ecological effects of mechanical thinning is incomplete, but evidence suggests that such treatments, even when carefully implemented, can adversely affect the environment in key ways. Mechanical thinning can:</p> <ul style="list-style-type: none"> • Remove large trees that are disease and fire resistant (DellaSala et al. 1995, USGAO 1999, Gorte 2000a, 2000b). • <input type="checkbox"/>ncrease mortality of residual trees due to pathogens and mechanical damage to boles and roots (Filip 1994, Hagle and Schmitz 1993). • Damage soil integrity through increased erosion, compaction and loss of litter (Meurisse and Geist 1994). • <input type="checkbox"/>Create sediment pulses in streams that harm fish (Grant and Wolff 1991). • Retain insufficient densities of large trees and woody debris to sustain viable populations of cavity nesting and woody debris dependent species (DellaSala et al. 1995). • Reduce habitat quality for Sensitive Species associated with cool, moist micro sites or closed canopy forests (FEMAT 1993).

USFS Disposition: This is an Other Issues because it is regarding a procedural concern [2c]. The Jess project mitigated impacts to natural resources through project design features to protect wildlife and fisheries habitat, soils and riparian function (Chapter 2 of draft

environmental impact statement). The ecological effects of mechanical thinning were analyzed by the interdisciplinary team and are disclosed in Chapter 3 of the draft environmental impact statement. The large trees being removed in the project area are already infected with dwarf mistletoe which is making the tree susceptible to impacts from other insects and disease (Vegetation section of draft environmental impact statement- Chapter 3). The removal of severely mistletoe infected trees will slow the spread of dwarf mistletoe to uninfected trees. The Forest Plan Standard and Guidelines for snags will be met and snags will be available for snag dependent species (Wildlife Section of draft environmental impact statement Chapter 3). Riparian Reserves will be treated only to improve their function (i.e. reduce fuels buildup or encourage large tree component) and will remain areas of cool, moist microclimates (Water Quality section of draft environmental impact statement – Chapter 3).

(7) Relevant Issue #1: Logging will remove northern spotted owl (NSO) habitat and exacerbate the effects of barred owl competition on the northern spotted owl.

Commenter # - Comment #	Comment
5-28	As shown from the NSO Recovery Plan, owl populations continue to decline, therefore it is of the utmost significance to protect all suitable habitat. Further, the Klamath National Forest and surrounding forests need to know what the baseline population of owls are, especially given the fact that multiple landscape level projects are taking place throughout the owls range.
5-31	There is no need for forestry “improvements” that do not aid in the recovery of the NSO. In order to protect NSO habitat and simultaneously protect against the threat of wildfire, the purpose and need for the project should be to focus on maintaining big old fire-resistant trees while treating the small diameter understory.
5-32	The use of language descriptive of habitat does not change the underlying fact that the proposed actions are based in very large part on the desired silvicultural prescriptions. While such technical concerns are of course relevant to forest management, they are a dangerously incomplete guide to the restoration and conservation of habitat. This is highly relevant to the question of NSO habitat, of course, because the single-minded pursuit of silvicultural objectives was the single most important reason for the current condition across the Klamath National Forest, and throughout the NSO's range. The absence of applicable scientific evidence will increase our concern that the Forest Service is continuing to pursue silvicultural objectives at the cost of wildlife habitat values. It would be arbitrary and capricious for the Forest Service to follow such a course. The Forest Service must, at the very least, disclose the likely negative effects for NSOs and other species dependent on mature and late-successional forests.
5-33	Protecting habitat is of utmost importance for the NSO given the continuous threats the species is up against. What had been viewed, as less-than-significant impacts on NSO may now need to be evaluated much more critically, with an eye to a regional conservation strategy rather than one that spans the entire NW Forest Plan area. Reconstructing roads and landings and bringing canopy down to 15% would increase brush response and ground fuels and would remove suitable habitat within Critical Habitat.

Commenter # - Comment #	Comment
5-36	The FS has not taken a “hard look” on thinning in NSO activity centers, Critical Habitat, LSRs, Riparian Reserves and N/R/F habitat including the breeding pairs in the project areas.
5-37	If Barred owls are in the project area this should be an indication that the current habitat is inadequate and habitat should be upgraded, rather than downgraded and degraded. Please take note of the literature below regarding the presence of barred owls in NSO habitat. Barred owl competition and displacement are significant concerns emerging in the status review for the Northern Spotted Owl. The 2004 status review panel unanimously identified barred owls as a future threat to the spotted owl. http://www.sei.org/owl/meetings/Presentations/June/Gutierrez-Threats.pdf
5-39	It is important not to exacerbate the effects of barred owl competition on spotted owl because the logging can reduce the competitive advantage for spotted owl, as described by Dugger et al. 2011(attached).
5-105	Seamans and Gutierrez (2007)(attached) found that mechanical treatments (e.g., thinning) of as little as 20 hectares (about 50 acres) within the 400--hectare home range core area of spotted owls reduced colonization of territories by spotted owls, and increased the probability of breeding dispersal away from territories—both substantially negative indicators for spotted owl conservation.
5-107	Protection of additional suitable habitat in order to reduce competitive interactions between the two owls is now a recognized tool in the toolbox and represents significant new information about any proposal to modify suitable habitat regardless of how far the planning process may have proceeded. A well---known axiom of the species-area relationship from island biogeography holds that as habitat area increases, the number of cohabiting species also increases.
5-114	To the degree that thinning opens forest canopies and eliminates multi-layered internal forest structure, through skid roads, cable corridors and landings, it generally is not compatible with conservation of habitat for spotted owl or other Sensitive Species that exist in the analysis area.

USFS Disposition: This relevant issue is addressed through the development and analysis of alternative 3 (see chapter 2 of the draft environmental impact statement). Neither alternative 2 nor 3 will remove, downgrade or degrade any nesting/roosting habitat. Alternative 2 will remove or degrade foraging habitat (Chapter 3 Wildlife section of draft environmental impact statement). Alternative 3 was designed to not remove or downgrade any suitable foraging habitat. The impacts to resources are compared in Chapter 2 of the draft environmental impact statement and in the resource analysis in Chapter 3 of the draft environmental impact statement. Meiman et al (2002), Brown et al (2005), Dugger et al (2011) and Seasman and Gutierrez (2007) were the literature discussed above that was related to a project specific comment and was provided to the Forest for review. Meiman et al (2002), Dugger et al (2011) and Seasman and Gutierrez (2007) focused on the idea that timber harvest in NSO nesting cores and home ranges can have a detrimental impact on nesting success, fidelity to the nest site and increase competition from barred owls. These concepts have been incorporated into the project design and analysis for both alternative 2 and alternative 3. The project design features and alternative descriptions can be found in Chapter 2 of the draft environmental impact statement and appendix A. The analysis of

impacts to NSO is summarized in the Wildlife section of Chapter 3 of the draft environmental impact statement. Brown et al. (2005) is a summary of the science on forest restoration meant to increase resiliency to wildfire events. The objective of the Jess project includes resilience to wildfire and many of the principles presented by Brown et al. (2005) were incorporated into areas where wildfire resiliency was the focus. These include the use of strategic fuels treatments to increase the defensibility of the landscape. Some of the recommendations do not apply to the Jess project due to the other needs in the project area, including the need to reduce the dwarf mistletoe and blister rust infection rates. These treatments include the removal of white fir in some of the treatment units and opening up the forest canopy to remove infected trees.

(8) Other Issue: The project should address the potential for noxious weed spread and project design features that minimize the impacts.

Commenter # - Comment #	Comment
2-7	Noxious weed species are common within the project area. The DEIS should include a comprehensive survey of such weeds and possible mitigation measures such as: 1. Cleaning all off-road logging and construction equipment prior to entering the project area to remove dirt, plant parts and material that may carry weed seeds. 2. Include equipment cleaning in the timber sale contract. 3. Require equipment to avoid weed-infested areas.
5-90	Please address how fuel breaks and ground based logging will likely increase nonnative plant species as research has documented. Merriam 2007

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue is addressed through project design. Relevant scientific literature will be considered in the environmental impacts statement and relevant resource reports. Fuel breaks and ground based logging activities have the potential to increase noxious weed infestations within the project area; however project design features have been incorporated into the project design to reduce these risks. Refer to the Jess project Noxious Weed Risk Assessment for detailed noxious weeds project design features and the risk rating for noxious weeds within the Jess project area.

(9) Other Issue: The project should be designed for a 30-40 year effectiveness including aggressive treatments that open canopies, create large openings (1-2 ½ acres) and culture hardwoods in the treated stands.

Commenter # - Comment #	Comment
3-1	The analysis needs to display how long the treatments will be effective in meeting the designed purpose and need. All the proposed commercial units are in the Matrix land allocation. In order to meet the desired condition for ecological restoration and fuels management the treatments will need to be intensive enough to be effective for a considerable period of time. A letter from the Regional Office discusses the need to not plan for reentries into areas for a least a 20

Commenter # - Comment #	Comment
	year time period (Attachment 1). In order to treat more acres over the next several decades we recommend prescriptions be developed that allow for a 30-40 year effectiveness. Since the commercial product units are within the Matrix land allocation we believe the leave tree spacing should be a minimum of 25 – 35 feet.
3-2	We have seen too many instances after implementation that more trees should have been cut. This was caused by either the designed treatment standards not being achieved or established effectiveness time frames not being met. We recommend leave tree marking in all the commercial thin units to more fully meet the designed silvicultural prescriptions.
3-3	In order to meet your objectives of ecological restoration and fuels reduction, treatments will need to be fairly aggressive. Canopies will need to be opened up considerably in order to mimic historic conditions and reduce stand densities to alleviate detrimental effects from a wildfire and other forest health issues.
3-4	We believe the current prescriptions shown in the scoping notice will meet the intent of the project objectives. We are happy to see emphasis placed on treating diseased stands in order to promote some resiliency within the treated stands. We also support your efforts in creating 1 – 2 1/2 acre openings in some of the stands.
3-5	The proposed action also discusses the need to culture and promote hardwoods within some of the treated stands. Hardwoods are generally an early seral component. As stands age hardwoods are replaced by conifers due to competition for light and nutrients. In order to maintain hardwoods within treated stands, aggressive conifer removal around the existing oaks will need to occur. The proposed prescription appears to be adequate to meet your objectives of maintaining hardwoods.
3-6	We believe an alternative needs to be assessed that meets the Regional direction for ecosystem restoration and forest resiliency.
3-7	We believe an alternative should be developed and analyzed that achieves a 30-40 year effectiveness.
3-23	As a forest industry and being professional foresters we are very concerned that good forestry be practiced on the Forest Service land base. We ask you to develop prescriptions that truly meet the particular needs of the stands and land base. We have seen too many instances where prescriptions are developed to address public concerns from entities that have personal agendas and biases and have no background or knowledge of the forest environment and ecosystem. Prescriptions developed in these instances do not meet the needs of the stands, land allocation standards and guides, project purpose and need, and long term forest protection and health.
5-85	Although many forests will require continued management, a common sense conservation goal is to achieve forests that are low maintenance and require minimal repeated treatment.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. The proposed action (alternative 2) was designed to meet Regional direction for ecosystem restoration and forest resiliency and achieve the 30-40 year effectiveness suggested in these comments. Other alternatives will be analyzed in terms of meeting these criteria. Temporal bounds for analysis are described in the Vegetation (Silviculture) Report. Leave tree marking is being implemented in many units, but discretion will be used to

determine benefits and efficiency of other options. Post-treatment canopy information from predictive modeling analysis is available in the Wildlife Report. Reference conditions for prescription development are discussed in the Silviculture Report. Prescriptions have been altered slightly since scoping to address field trip discussions regarding skips (clumps) and gaps (openings). Prescription details are available in appendix B of the Silviculture Report. Forest Plan Standards and Guidelines will be met (Vegetation Section of draft environmental impact statement Chapter 3). Treatment length of effectiveness has been considered and will require monitoring of conditions to ensure restoration objectives will be met.

(10) Other Issue: Restrictions to the project including diameter limits, limited operating period, excessive project design features and limits in Riparian Reserve treatments will impact the project's effectiveness and will increase the cost of implementation.

Commenter # - Comment #	Comment
3-13	Limited operating periods also affect implementation economics. There could potentially be several limited operating periods identified in the proposed action. Many of these restrict operations between February 1 and September 15. This does not allow much time for harvest activities to occur prior to the wet weather period. These restrictive limited operating periods will have significant increases in logging costs as contractors cannot afford to utilize very expensive equipment for such a short time period. It is also more difficult to hire employees with such a short guarantee for work. These factors need to be included in your logging cost assessment.
3-14	We ask that you carefully assess and review proposed restrictions and mitigation items. It must be clearly documented they are needed. Additional mitigation items will require contractors to incur additional costs for a project that may have marginal economics.
3-20	We ask that you carefully assess and review proposed restrictions and mitigation items. It must be clearly documented they are needed. Additional mitigation items will require contractors to incur additional costs for a project that may have marginal economics
3-17	Some of the proposed actions are planned within Riparian Reserves. In order to meet your stated objectives, treatments within the riparian reserves is essential. There will be those who advocated no treatment within riparian reserves. Not treating riparian reserves does nothing in terms of providing resiliency for these important ecosystems. Recent research has demonstrated the need to treat riparian reserves in order to protect them from catastrophic events and meet forest restoration efforts. We have attached two such research documents to support your efforts in treating the riparian reserves (Attachments 2 & 3).
3-18	AFRC wants to go on record of not supporting alternatives that set diameter limits within any land allocation. This would be counterproductive to your employee's time during the NEPA analysis. Diameter limits are arbitrary designations that do not have any silvicultural merit. They are counterproductive to meeting your identified purpose and need statements. AFRC does not and will not support diameter limits as they are not compatible with your current land management goals for this project area.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. Project design for the proposed action and alternatives are relevant to Forest Plan direction and other laws and regulations, while avoiding extraneous mitigations. Relevant scientific literature will be considered in the environmental impacts statement and relevant resource reports. Although Van De Water and North 2011 found modeled severity in the Riparian Reserve greater than upland forests, it also depended on other factors that influence fire behavior. Topography between uplands and riparian areas, differences in stand structure, and composition of vegetation. There were no differences between riparian and upland stands in percent crown scorch in mixed-evergreen, mixed conifer, and ponderosa pine forests types of southwestern and northeastern Oregon. The Jess project area is consistent with mixed-evergreen, mixed conifer, and ponderosa pine forest type. Therefore, we can assume there will be no difference in fire severity between riparian and upland forests. Additionally, Water board requires the FS to retain natural shade within designated riparian zones. We cannot treat all of the Riparian Reserve without reducing natural shade. Therefore, No Riparian Reserve treatments are proposed in alternative 3. Action alternatives 2 include treatment in Riparian Reserves in the outer 70'.

For limited operating periods: The Forest Service includes LOPs as needed to protect forest resources in compliance with the standards and guidelines of the Forest Plan and other laws and regulations, including Endangered Species Act and Clean Water Act. For proposed restrictions and mitigation items: The Forest Service incorporated project design features into the project design for this project to ensure compliance with associated laws, including but not limiting to NFMA (Forest Plan S&G compliance), Clean Water Act, Endangered Species Act, and National Historical Preservation Act. See analysis and compliance sections by resource in chapter 3 of the EIS, and see the disclosure of compliance with other laws and regulations at the end of chapter 3 of the EIS. For AFRC: The silviculture prescription process is directed by FSM 2470 and ensures that Forest Plan goals, objectives and standards and guidelines are considered and followed. A USFS certified silviculturist has prepared prescriptions for each unit based upon site-specific characteristics to meet project needs and desired conditions.

(11) Concern: Measures used to analyze the project should be accurate and repeatable such as basal area, trees per acre, stand density index, or spacing.

Commenter # - Comment ##	Comment
3-19	When developing measurement standards for NEPA implementation do not use crown closure. There is no one set way to measure crown closure before or following treatment. No method has been developed that gives the same or an accurate measurement. The measurement standards need to be something that can be measured correctly before and following treatment; basal area, trees per acre, stand density index, spacing, etc.

USFS Disposition: This is a concern because it does not meet the definition of an issue [3]. The measures used in the analysis will be appropriate to the resource and regulation needs and will include basal area, trees per acre, stand density index and canopy cover.

(12) Other Issue: Inadequate road systems and landing sizes can impact the efficiency and economics of the project and increase environmental impacts.

Commenter # - Comment #	Comment
3-10	The proposal identifies utilizing three miles of existing road beds as temporary roads to assist with short-term access. We are very aware there will be undue pressure put on the decision maker to not develop any temporary roads for this project. We take the opposite view point. Temporary roads can allow for more effective and efficient management of the public's land. They can provide for better economics and in many cases reduce environmental impacts as compared to alternative treatments such as long skids.
3-11	It is important an adequate road system be developed and utilized in order to effectively and efficiently harvest the timber from this project. While decommissioning unneeded roads is understandable and supportable we also ask that serious consideration be made for including temporary road construction that will assist with the implementation of this project. We encourage the building of temporary spurs where feasible to reduce the harvest costs and more effectively treat the land base. This is especially true where existing road prisms already exist.
3-12	Insure landing size is adequate to support the proposed harvest system. If whole tree yarding/top yarding is proposed make sure landings can accommodate the merchantable and unmerchantable material.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue has been addressed through project design for the proposed action and alternatives. All options for treatment were considered and no area was dropped from the project due to the need for a temporary road for access or inadequate landing size. Impacts will be disclosed in the environmental impact statement.

(13) Other Issue: The economic viability of the project needs to be a planning consideration in order to avoid cumulative impacts to the local timber industries.

Commenter # - Comment #	Comment
3-8	The proposal currently identifies 690 acres of ground based and 120 acres of cable. Given the small amount of proposed cable harvesting, economic consideration will be very important for successful implementation of the project. It is essential to assess the feasibility in relation to volumes per acre, size of trees being removed, distance to landing, species of tree being removed, current delivered log prices, etc. Logging costs, fuel costs, haul costs, and lumber prices have been in a state of flux over the last several years. We ask that you take these recent increases and decreases into consideration in your economic analysis.

Commenter # - Comment #	Comment
	<p>Logging Systems: The following is a rule of thumb to follow when assessing logging system viability:</p> <p>Ground-Based harvesting – desire, as a minimum, to average 6-7 mbf/acre (more is needed if biomass removal is expected).</p> <p>Cable harvesting – desire, as a minimum, average 10 mbf/acre. Also with skyline harvesting in order to pay for move in and move out costs the project should have a minimum of 2 mmbf. Species, yarding distance, haul distance, and size all play into the amount of volume needed to economically skyline/cable harvest.</p>
3-9	<p>It is important the project analysis complete an adequate assessment of all Social and Economic issues and concerns. Due to the economic conditions within Siskiyou County it is imperative that social and economic issues be seriously considering when developing and selecting alternatives for implementation.</p> <p>If you look at Forest Service Manual, section 1920 Land Management Planning, there is a very important section that often plays second fiddle to all the resource issues on any given project. Given the number of pages dedicated to environmental issues, it is no wonder that our counties and communities do not fair well with Forest Service projects. I have included the portion of the handbook that deals with specifics that we believe should be considered. See original letter for referenced FSM.</p>
3-16	Bottom line is the project should be able to stand on its own in terms of economic viability. Additional funds should not be required to fully implement the final decision.
3-22	Industry infrastructure is very important in terms of implementing your projects. This needs to be a consideration when assessing economics and project design. As project size and volumes shrink during the NEPA analysis it may not individually seem to have any impact on industries ability to implement. But cumulatively, as all projects shrink, it has a major impact on the ability to maintain adequate infrastructure to accomplish your land management activities.
4-1	Some of California's remaining sawmills are, in part, dependent on wood supply from the National Forests; Trinity River Lumber is one example.

USFS Disposition: This is an Other Issue [2a and 2b]. Economics was considered in the development of the proposed action and its alternatives. The environmental impact statement compares the economic impacts by alternative (Economics and Society section of draft environmental impact statement- Chapter 3).

(14) Other Issue: The purpose and need of providing a broad range of ecosystem services will not be met by the activities proposed.

Commenter # - Comment #	Comment
5-9	The last purpose and need for the project is to provide a broad range of ecosystem services, including wood products, rural economic health, biodiversity and beneficial uses of water. The project as proposed offers wood products at the

Commenter # - Comment #	Comment
	expense of biodiversity and the beneficial uses of water and offers little in the way of rural economic health. If the KNF were truly interested in rural economic health it would provide contracts and jobs in stewardship to local people rather than contracting to large companies whose tax payer subsidized profits from national forest logging provides employment to mostly people outside these communities.

USFS Disposition: This is an Other Issue [2a and b]. The environmental impact statement will analyze and disclose how the proposed action and alternatives meet the purpose and need. The analysis includes and assessment of meeting the purpose and need including how the project will provide a broad range of ecosystem services in Section 2.5 (Table 7).

(15) Relevant Issue #3: The project should include fuels treatments along the Sawyers Bar Road from the Forest Boundary to Sawyers Bar, CA.

Commenter # - Comment #	Comment
4-2	CFA believes there is an excellent opportunity to expand the Jess Project by adding to the Purpose and Need to include "public safety".
4-3	The Sawyers Bar Road from 3 miles west of Etna, where it enters the National Forest, to Sawyers Bar is the only escape route should a wildfire occur in the general area. The portion of the Sawyers Bar Road from the Forest Boundary to Sawyers Bar should have a ¼ mile-wide shaded fuelbreak to: <ol style="list-style-type: none"> 1) Provide for a reasonable escape route; 2) Provide a fuel break that would bring a stand-replacing wildfire out of the canopy to the ground where suppression crews could then direct attack the ground fire and put it out.

USFS Disposition: Although this is categorized as a relevant issue and an alternative was developed, the alternative was eliminated from detailed study (alternative A, Section 2.3) because the proposed addition is outside the scope of the project.

(16) Concern: The project should consider the use of mechanical and strategic fuels treatments before handpiling and burning.

Commenter # - Comment #	Comment
3-15	The project should carefully look at fuels reduction options. Hand piling should be the last option as it is very expensive and can lead to a non-viable project. Yarding tops and lopping and scattering should take care of most of the fuels issues within the treated stands. Whole tree yarding can also be utilized when using mechanized harvesting.

Commenter # - Comment #	Comment
4-5	Further, we believe, generally the fuelbreaks will need to be at least ¼ mile wide to be effective in bringing a stand-replacing wildfire to the ground where suppression crews can safely direct attack the ground fire. Some Ridgetops will not be wide enough to accommodate a ¼ mile wide fuelbreak; in those cases, designing mechanical thinning to feather into the overly dense adjacent stands would be needed.
4-6	Finally, CFA strongly suggests that anytime the Forest is considering “hand-thinning”, you should immediately stop and consider alternatives that would use mechanical thinning methods. Hand thinning is going to rarely be an economic method and rarely, if ever, will meet a fuel objective for the next 20-30 years.

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. This concern was considered in developing the proposed action. Mastication and mechanical thinning are included in alternatives 2 and 3; six acres of mastication were changed to handpiling and burning due to access problems (Table 6 includes acreage of these treatments in alternatives 2 and 3).

(17) Other Issue: The collaborative effort required by HFRA has not been met by the Forest.

Commenter # - Comment #	Comment
5-1	It is apparent from the marking guidelines and Scoping notice that our organizations concerns over canopy reduction, logging large fire resilient trees, especially within Northern Spotted Owl Critical Habitat and Riparian Reserve logging continue to be ignored. For these reasons we believe that the Klamath National Forest, particularly the Salmon/Scott Ranger District is abusing Healthy Forest Restoration Act (HFRA) authorities. The agency’s claim of “collaborating” is not entirely based in truth.
5-2	Our organizations refuse to be part of any “collaborative” to forward the districts monetary interests but will be participating in the NEPA process to maintain legal standing and to contribute the best available science administrative record so that it would be used in the planning process and incorporated in project design.

USFS Disposition: This is an Other Issue because it is already decided by law, policy and regulation. There is a summary of the public involvement and scoping section in chapter 1 of the draft environmental impact statement along with discussion on how the project meets the HFRA requirements. A summary of how the collaborative process helped to shape the project and its alternatives can be found in appendix E of the draft environmental impact statement.

(18) Relevant Issue #4: Mistletoe provides benefits to forest ecosystems by creating diversity, structural irregularity, snags and downed wood. Wildlife uses mistletoe-infected trees for nesting and as food sources. Retain the mistletoe component of the habitat in the Jess project area via thin from below practices that leave the large infected trees.

Commenter # - Comment #	Comment
5-14	Mistletoe provides many stand benefits (diversity, gaps, irregularity, snags and down wood). The purpose and need for this project might be better met by retaining, rather than removing, mistletoe infected trees.
5-15	Please consider implementing projects such that mistletoe habitat is retained. Mistletoe provides significant benefits to forest ecosystems. As evidenced by the June 2011 agreement between the Murphy Company, KS Wild and the BLM, mistletoe trees can be retained while small-diameter thinning objectives are met. Such an alternative is reasonable and should be analyzed.
5-16	The forthcoming NEPA should answer the following questions: How many mistletoe trees will be logged? Where are they located? What is the environmental baseline? How many wildlife species will be impacted by mistletoe removal?
5-17	Mistletoe does not inhibit forest health. Mistletoe does reduce the growth rate of the host trees, but that is only a forest health problem if one believes that fiber production is the only measure of forest health. Mistletoe creates complex habitat structures such as brooms and snags and is a natural and vital part of the ecosystem.
5-14	The benefits of dwarf mistletoe as wildlife habitat and a food source are well known. Not only does the presence of mistletoe contribute to stand diversity through the creation of gaps, structural irregularity and contribute to the accumulation of snags and down wood, it also serves as habitat for a variety of mammals, birds and arthropods. In particular, large Witch's brooms serve as nest platforms for spotted owls and raptors.
5-100	<p>While dwarf mistletoe has traditionally been viewed as a forest pest because of reducing in timber volume, these sources suggest that in areas where management goals are not strictly focused on timber production, control of dwarf mistletoe may not be justified, practical, or even desirable. The data suggests that dwarf mistletoes may have positive influences on wildlife habitat. Consequently, they suggest that eradication efforts be reconsidered given that dwarf mistletoes have been a part of these forest ecosystems for thousands of years. Forest insects and pathogens are increasingly being recognized as important agents in shaping the structure and composition of forests. Mistletoes affect the forest canopy, landscape pattern, and tree species mix. These plants are integral part of forested ecosystems, and have existed as part of the coniferous forests of North America since the Miocene.</p> <p>Dwarf mistletoe is important to the ecology of these systems. The fruit, foliage and pollen of dwarf mistletoe are a food source for numerous bird, mammalian and insect species. Dwarf mistletoe alters the growth patterns of infected trees, creating structural complexity within forests in the form of witches brooms and snags, both which are used by numerous wildlife species for nesting, roosting and cover. The witches, brooms and higher snag densities in infected areas enhance habitat values for birds and other wildlife. In considering the beneficial aspects of dwarf mistletoe infection, it seems reasonable to assume that it is the large infected trees, particularly those with large witches' brooms, which have the greatest ecological value. Mistletoe presence, incidence, and severity may not be good indicators themselves of wildlife habitat value. Wildlife species are probably responding in a complex way to special features such as brooms and snags, to vertical crown structure, to canopy gap pattern, and other factors affected by mistletoes. Mistletoes are also valuable as mistletoes themselves and as members of a biotic community.</p> <p>Mistletoes possess aesthetic, scientific, and intrinsic values. Forests are not only managed for the resources they produce but also to sustain and protect forest health and ecosystem values. Dwarf mistletoes are important</p>

Commenter # - Comment #	Comment
	<p>disturbance agents with distinct ecological functions. They contribute to natural diversity structurally and biologically. trees were killed but left standing for woodpeckers and other cavity-nesting animals. Although these snags are used, they remained standing for only a few years. Studies of broom use by wildlife include work by Parks and others (1999a), Hedwall (2000), and Garnett (2002). These studies identify which birds and mammals use witches, brooms, how they use it (for nesting and roosting), and what kinds of brooms are preferred. This information is useful to determine if retaining certain brooms is a potential benefit for a favored species. Information still lacking is knowledge of how the number and distribution of snags and brooms relates to levels of mistletoe infestation and to wildlife populations and the dynamics (rates of generation and loss) of these features. Where wildlife habitat is an important consideration, it may be desirable to maintain or encourage features resulting from mistletoe infections, such as snags and witches, brooms. The same factors that can be manipulated to reduce mistletoe spread, intensification, and effects can also be used to enhance these processes and produce a continuing supply of dead and diseased trees. From certain perspectives and in some situations, dwarf mistletoe infestations have beneficial impacts for associated species and communities. In old-growth forests, dwarf mistletoes may exert a different set of effects on infected trees and display different dynamics. Special management strategies and silvicultural treatments for infested stands are required where the objectives are to maintain and enhance wildlife habitat, oldgrowth character, and other ecosystem values.</p> <p>Greater bird diversity is associated with increased mistletoe infestation (24 of 28 species positively associated); the key limiting resource for the birds in this situation may be snags. Parker (2001) reports a similar study in a northern Arizona ponderosa pine forest. He finds, however, a more complex situation with four species positively associated with mistletoe (cavity-nesting birds), five species with a negative association (avoiding infested areas), and seven with no relation (indifferent). Fairweather (1995) and Parks and others (1999b) describe mistletoe control treatments in which infected</p>
5-102	<p>There is an urgent need for the BLM to reevaluate its current strategy for managing dwarf mistletoe, and to adopt an integrated ecosystem perspective that manages for forest ecosystem integrity, rather than waging a war against dwarf mistletoe. An integrated management strategy that restores some of the fundamental components and processes that historically existed in these systems would largely eliminate the mistletoe problem. All components need to be incorporated into an overall management plan for any one of them to work correctly. Such an integrated strategy would include the following fundamental components: 1. No cutting of large diameter trees and snags. 2. Thin understory trees to create stand structure and densities that approximate presettlement conditions. 3. Reestablish regular ground fires in order to minimize seedling survival and to prevent the accumulation of fuel. 4. Reduce livestock densities to a level that will allow a relatively continuous ground cover of herbs and grasses to develop where light, soil and moisture conditions would normally support such vegetation. Once forests are thinned and opened up, they will simply return to their prethinning densities if livestock remain to prevent the reestablishment of ground cover.</p> <p>The most vigorous dominant and codominant trees should be retained. Selection of "leave trees" should be based on overall tree qualities rather than just mistletoe. A lightly infected dominant or codominant tree is usually a better choice</p>

Commenter # - Comment #	Comment
	<p>for retention than an intermediate or suppressed tree without visible infection. Underburning may well be a good ecological approach for managing dwarf mistletoes on many ponderosa pine and mixed conifer sites. Often a combination of mechanical thinning and burning can be used to reduce infection levels and improve overall stand conditions. Fire can be used to help maintain infection at or below a desired level, perhaps allowing longer intervals between mechanical treatments. Significant amounts of crown scorch are probably needed to provide a controlling effect. Prescribed fire will be more effective in reducing infection levels when crews can "shape" the fire (increase intensity) within infected areas. Fires covering relatively small areas (certainly no more than a few hundred acres at a time) should provide better results than larger fires, since crews generally have more control over coverage and intensity.</p> <p>Larger trees often tolerate more dwarf mistletoe infection without deleterious effects. One of the major challenges for management of infested uneven-aged stands is the dispersal of dwarf mistletoe seed from infected overstory trees to the understory. Although the predominant opinion has been that dwarf mistletoe intensifies rapidly after a partial cutting or disturbance such as windthrow. In view of the uncertainties and potential adverse effects from selection and partial cutting in infected stands, use of the appropriate criteria for selecting and retaining trees is especially important.</p>
5-103	Marshall et al (2003) noted that approximately 90% of known Spotted Owl nests on the Applegate Ranger District of the Rogue River National Forest were in dwarf mistletoe brooms in Douglas-fir trees.

USFS Disposition: This issue was considered relevant and an alternative was developed. However, the alternative was considered but not analyzed in detail because the retention of large mistletoe-infected trees throughout the project area will not meet the purpose and need of the project (alternative B in Chapter 2 of the draft environmental impact statement).

(19) Other Issue: Logging can increase the rate of mistletoe infected forests.

Commenter # - Comment #	Comment
5-18	Ironically, logging practices often contribute to the spread of dwarf mistletoe. When soils are disturbed and ground cover is removed during logging operations, stand densities increase because seedlings readily germinate and grow on bare mineral soil. Such disturbances are particularly prevalent when heavy machinery is used to remove trees.
5-19	Logging may increase mistletoe in the remnant stand, rather than decrease it. Many mistletoe seeds that infect host trees do not readily produce aerial shoots; these are known as "latent infections" (Knutson and Tinnin 1980 attached). After thinning, 90 percent of all latent infections will appear within five years (Shea 1964).

Commenter # - Comment #	Comment
5-101	<p>Land use activities (grazing, logging, and fire suppression) have encouraged the spread of dwarf mistletoes. Many of the silvicultural challenges created by these parasites are exacerbated by ecologically insensitive land management policies such as fire suppression, livestock grazing, and inappropriate silvicultural techniques. In general, dwarf mistletoe only becomes a problem when land managers attempt to create highly productive forests or tree farms to grow timber far in excess of historical production rates. Probably the most significant forest health problem in the Northwest is that there are too many fiber plantations, primarily small and medium-sized trees, over vast areas. Thus, efforts to improve forest conditions should focus on areas that can benefit the most from thinning.</p> <p>The damaging effects of mistletoe can best be minimized, and their ecological benefits maximized, by recreating forest stands with age, size and density distributions similar to the original, presettlement forests. In none of the aggressively treated research plots was dwarf mistletoe eliminated. After treatments had reduced the parasite to undetectable levels, populations inevitably began to rise in these experimental areas. Foresters are often surprised to see considerable infection in treated areas thought to be rid of dwarf mistletoe. When stands are opened up by selective harvest or thinning, dwarf mistletoes are stimulated. Latent infections are more apt to develop shoots; existing shoots grow more rapidly and produce more seed. This is probably a result of both improved tree vigor, which provides more water and nutrients to the parasite, and increased light.Entering a stand to remove only the more heavily infected trees is usually not an effective way to manage dwarf mistletoe or to improve forest conditions. In most cases, stand infection levels would rebound to even higher levels before the next entry and become progressively more severe over time. Infection should generally be reduced as Group selection has also been perceived and used recently as a tool for treating dwarf mistletoe. However, its efficacy for control of mistletoe is largely untested, and opinions and perspectives vary. The creation of small openings can be very favorable to dwarf mistletoes over the long run, leading to heavy losses. In many cases, the regeneration that develops within the openings will be exposed to infected trees on the edges, and, in some cases, from infected trees within the openings. The parasite can penetrate small (1- to 4-acre) openings relatively quickly. Because the spread and intensification of dwarf mistletoe in uneven-aged, multistory stands can be quite rapid, management of these stands is a serious challenge.</p>

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. The prescription for the mistletoe-infected areas takes this science into consideration and has been carefully designed to avoid the exacerbation of infection in the project area as will be analyzed and disclosed in the environmental impact statement and Silviculture Resource Report. Relevant scientific literature will be considered in the environmental impacts statement and relevant resource reports.

Watson and Herring's (referenced as Watson and Mathew in comment) (2012) research discusses mistletoe as a keystone species, but does not discuss logging practices in relation to spreading dwarf mistletoe. Mistletoes present in the project area are primarily dwarf mistletoes in the genus *Arceuthobium* (Viscaceae) and to a lesser degree, one true mistletoe, *Phoradendron* (Viscaceae) (found in incense-cedar). Although *Arceuthobium* and *Loranthaceae* are both considered keystone species (Watson, 2012 and Shaw et al, 2004),

there are a number of differences that influence the management proposed in this project. The effects of *Arceuthobium* on their hosts are dramatic and deleterious, whereas *Amyema* (Larantaceae) rarely has any negative effects on host growth form or survival (Shaw et al, 2004). Mathiasen (personal communication, 2005) indicated that there is much more mistletoe present on the landscape now than endemic levels. These two factors have influenced the decision to reduce dwarf mistletoe in selected stands that have high levels of infestation in order to promote the growth and vigor of uninfected species both in the overstory and secondary canopy levels. Dwarf mistletoes are native plants that play an important role in the ecology of forest ecosystems and complete removal from forest ecosystems could have a disproportional impact on forest ecology (Shaw et al, 2004). The mistletoes (Visaceae) within the project area will continue to have a presence and positive effect on vertebrate diversity. Silvicultural prescriptions were written to reduce the elevated levels of infestation while restoring species diversity and promoting fire resilience within stands.

Knutson and Tinnin's research (1980) describes latent infections as undeveloped sites that do not readily produce aerial shoots. The cause of latent infections is unknown (page 9) although it has been shown that the more open the stand, the less likely that latent infections would appear. The restoration prescriptions incorporate the recommended management activities as described for favoring trees which include removing overstory from dense understory and thinning the understory, maintaining mixed-species stands, favoring tree species that are immune to the species-specific mistletoes, and favoring trees without infections in the upper half of the crown (Knutson and Tinnin, 1980). Wider spacing than the optimal dwarf-mistletoe spreading distance of 12-feet is also proposed. Because the complexity of managing dwarf mistletoe is widely recognized, prescriptions were carefully developed according to scientific research recommendations. Modeling outputs support the prescription objectives to reduce mistletoe (Vegetation Section of draft environmental impact statement-Chapter 3).

(20) Other Issue The removal of large trees violates the conditions of the Healthy Forest Restoration Act (HFRA)

Commenter # - Comment #	Comment
5-13	The removal of large-diameter trees is simply not necessary in order to attain the objectives of this HFRA project. Please note that removal of large trees violates §102(f) of HFRA, which requires that the agency "maximize the retention of large trees." All efforts should be made to retain large fire resistant trees on the landscape.
5-29	§102(e)(2) of HFRA, which requires that: "In carrying out a covered project, the Secretary shall fully maintain, or contribute toward the restoration of, the structure and composition of old growth stands according to the pre-fire suppression old growth conditions characteristic of the forest type, taking into account the contribution of the stand to landscape fire adaptation and watershed health, and retaining the large trees contributing to old growth structure."

USFS Disposition: This is an Other Issue because it is already decided by law, policy or regulation [2b]. The Jess project is authorized under the Healthy Forest Restoration Act (HFRA) section 102(a)(4) Threats to Ecosystem Components or Forest and Rangeland

Resources. This section of HFRA is exempt from the old-growth and large tree retention provisions required under Section 102(e) and 102(f). The project area has epidemic levels of mistletoe infection which especially impacts Douglas fir and white fir and pose a significant threat to ecosystem function. Lindenmayer et al. (2012) was used to support a project specific comment and was provided to the Forest for review. The paper focuses on the loss of large trees throughout the world and their ecological importance. The Jess project is retaining large trees when it does not limit the accomplishment of other objectives of the project, specifically the reduction of disease infection rates. There is no consensus as to the definition of a large tree for the Jess project. During the June 27, 2013 meeting there was a suggestion that some of the collaborators considered a tree larger than 20" dbh a large tree. Trees larger than 20" dbh are marked for commercial harvest when they are diseased (mistletoe, blister rust) and there is risk of understory infection, they are dying quickly (heavy blister rust infection, rotten boles), or, sometimes a healthy tree will be taken if they are near a preferred species in order to reduce competition. Some trees larger than 20" dbh are marked where the intent is to favor hardwood species. Trees larger than 20" dbh that meet hazard tree criteria for impacting roads and other infrastructure are also slated for removal during commercial harvest.

(21) Other Issue: Logging large sugar pines will not control blister rust and may exacerbate the infection rate.

Commenter # - Comment #	Comment
5-22	If indeed, after decades these trees [blister rust infection] succumb to disease they will be contributing to snag and CWD requirements needed for healthy forest stands. Science shows that opening canopy will enhance spore germination and host penetration especially in late summer when logging often takes place. The forthcoming NEPA should disclose and analyze the intricacies and details such as these.
5-21	Logging large sugar pines with blister rust will do nothing to control the spread of this disease. Larger pines with blister rust can often tolerate infection.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. The proposed action and alternatives do not propose the removal of large sugar pines for the purpose of blister rust infection control. The silvicultural prescriptions favor the large sugar pines for retention as will be disclosed in the environmental impact statement and in the Vegetation (Silviculture) Resource Report). Relevant scientific literature will be considered in the environmental impacts statement and relevant resource reports.

As the white pine blister rust research indicates, the prospects of regeneration, natural or artificial, are extremely bleak without resistance (Kinloch and Dulitz, 1990). According to Zeglen, et al, (2010), "Managing white pine requires both genetics and silviculture—genetics to increase a populations inheritable capacities for resistance and survival and silviculture to protect genetic resources, increase regeneration, reduce blister rust damage, and increase stand volume and wood product quality. Genetics and

silviculture applied in a cooperative, learning framework provide an adaptive management approach for preventing loss of white pine populations and returning them to their previous biological, ecological, and commercial roles in western North American forests (Zeglen, et al, 2010). Tomback and Achuff (2010) also site that management for infested populations should emphasize reactive restoration strategies including planting rust-resistant stock and using prescribed fire and thinning to encourage natural regeneration where sufficient seed sources remain. The project proposes planting rust-resistant sugar pine in openings where sugar pine was historically dominant.

Other Issue: “Large old trees are among the biggest organisms on Earth. They are keystone structures in forest, woodlands, savannas, agricultural landscapes and urban areas, playing unique ecological roles not provided by younger, smaller trees. However, populations of large old trees are rapidly declining in many parts of the world, with serious implication for ecosystem integrity and biodiversity.” (Lindenmayer 2012 attached)

The agency proposes to retain large fire resistant trees on the landscape. Trees marked for removal, regardless of diameter, are likely to have some disease, defect, or condition that would decrease their longevity or persistence on the landscape as a living tree. Others may be marked to reduce competition from neighboring trees that are a preferred species to retain that contribute to diversity on the landscape. In some cases, hazard tree criteria designate larger trees with the potential to impact roadways or infrastructure to be removed. One of the objectives of the project is to restore stands to a fire resilient condition. As the “Global Decline in Large Old Trees” article referenced above states, “maintenance of appropriate population age structures can help to ensure the perpetual supply of large old trees. This requires policies and management practices that intentionally grow such trees and reduce their mortality rates” (Lindenmayer et al, 2012).

(22) Concern: The wildlife analysis should disclose the impacts of the project on northern spotted owl and critical habitat, Management Indicator Species, and Forest Sensitive Species. The analysis needs to include information on snag levels and cumulative effects.

Commenter # - Comment #	Comment
5-27	The forthcoming NEPA document must quantify and qualify the impacts of the proposed mistletoe logging on NSO or their prey. The impacts of logging, snag removal, mistletoe logging, ground-based yarding and on the efficacy of critical habitat must be fully analyzed and disclosed in the forthcoming NEPA document.
5-46	Please include the results from required surveys [for goshawk] for the project in the DEIS.

Commenter # - Comment #	Comment
5-47	The forthcoming NEPA document needs to analyze and disclose the potential impacts of the project on Management Indicator Species (MIS) as defined by the LRMP. At a minimum it must address MIS "individual species" such as the NSO, pileated woodpecker, black bear, American Marten, Fisher and Black-tailed deer as well as the River/Stream/Creek Assemblage, the Snag Assemblage, the Down Woody Material Assemblage and the Assemblage.
5-104	NEPA documents should analyze and disclose the impacts of their logging proposals on spotted owl Nesting Roosting and Foraging (NRF) habitat. The DEIS should mention where, how much and/or what types of habitat is proposed for treatment including, Critical Habitat, Activity Centers and 100 acre LSR's.
5-48	The findings of the DEIS and Wildlife BA/BE must provide the decision maker and the public with enough information to conclusively know that the project will have no significant effect on threatened, sensitive, and management indicator wildlife species. 40 C.F.R. § 1508.27.
5-51	Information describing current snag levels and population surveys should be completed for MIS species within the project area. Please do not fail to substantively address the cumulative watershed effects of all actions in the affected watersheds and District and the impact on MIS by discounting cumulative impacts as individually minor impacts without examining their collective significance.
5-38	In considering this recommendation the agencies must prepare NEPA analysis which considers the full potential of suitable habitat quantity and quality and its mediating influence on the interactions between spotted owls and barred owls. Maintaining a subset of suitable habitat as recommended by the recovery plan is one option, but the agencies must consider the full benefits of protecting all suitable habitat, not just a subset.
5-57	We are very concerned with wildlife connectivity within the project area. Two Forest Sensitive species American Marten and Pacific Fisher and one Candidate Species that is state threatened, the California Wolverine, could be using the project area along with the Threatened Northern Spotted Owl and all those species are reliant on forest connectivity between the Trinity Alps and the Marble Mountain Wilderness Areas. The DEIS should address the current functioning of LSR's and Northern Spotted Owl Critical Habitat in/near the project area. Due to lack of recovery plan, continued degradation to habitat, and range-wide barred owl encroachment, connectivity for spotted owls is a particular concern. Given the fact that population numbers and surveys for the Pacific fisher have not been performed, cumulative effects on fisher populations are also of concern.
5-3	Further, as proposed this project is inconsistent with Forest Plan standards and guidelines and community wildfire protection plans.
5-23	"Project areas should be surveyed for the presence of Sensitive species before project implementation. If surveys cannot be conducted, project areas should be assessed for the presence and condition of Sensitive species habitat." LRMP at 4-23
5-24	"Management activities shall be compatible with the recovery of Endangered, Threatened (E&T) plants and animals." LRMP at 4-36

Commenter # - Comment #	Comment
5-25	"Collect information on Sensitive Species to assess population distribution and habitat associations...Inventory a portion of the suitable habitat each year. Assess conditions at occupied sites. Based on the assessment, use appropriate management techniques to maintain or enhance habitat suitability." LRMP at 4-38
5-26	The KNF must "seek to conserve E&T species and shall utilize its authorities in furtherance of the Endangered Species Act." FSM 2670.11
5-35	These large scale landscape treatments combined cover a huge expanse of territory and all have the potential to affect NSO habitat. The neighboring forest, the Shasta Trinity has multiple large-scale projects covering thousands of acres that will affect individual owls. The USFS as well as the FWS should consider these cumulative impacts and address how NSO activity will be monitored because of so many disturbances planned within Activity Centers, Critical Habitat, LSRs, Riparian Reserves and N/R/F habitat. The presence of owls in the project areas requires not only analysis and disclosure of potential impacts, but coherent, integrated cumulative effects analysis, as required by NEPA.

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. The environmental impact statement and Wildlife Resource Report, biological assessment, and biological evaluation include the appropriate analysis as required by law, policy and regulation. The effects to fisher, NSO, marten, MIS, and goshawk are analyzed.

(23) Concern: The project must comply with the Interim Air Quality Policy on Wildland and Prescription Fires, be under an approved Smoke Management Program and meet the General Conformity Law.

Commenter # - Comment #	Comment
2-5	The Forest Service should determine which aspects of the project comply with EPA's Interim Air Quality Policy on Wildland and Prescribed Fires and are included as part of the applicable EPA approved Smoke Management Program (SMP). All other aspects of the project should be evaluated for general conformity applicability to determine whether a full conformity analysis needs to be conducted. The applicable EPA approved SMPs should be included as part of the DEIS.

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. The air quality section of the draft environmental impact statement in Chapter 3 shows that the project meets the Conformity Rule and project design requires that prescribed fire be implemented under an approved burn and smoke management plan in coordination with the Siskiyou County Air Pollution Control District. The project will comply with the Clean Air Act and all other Air Quality regulations that apply.

(24) Concern: The Klamath National Forest has not prepared a conservation strategy for the Humboldt Marten or the Pacific Fisher which is in violation of the Forest Plan.

Commenter # - Comment #	Comment
5-40	No project-specific surveys have ever been completed for Pacific fisher or Humboldt marten, nor has the KNF prepared a management plan for these species. This is contrary to LRMP direction. Conservation strategies have not been completed contrary to LRMP direction.

USFS Disposition: This is a concern because it does not meet the definition of an issue [3]. The Klamath National Forest Land and Resource Management Plan does not require a conservation strategy for the Humboldt Marten or the Pacific Fisher.

(25) Other Issue: Logging will lead to fragmentation of habitat, the reduction in canopy and the removal of downed wood, which will impact Pacific Fishers and Humboldt Martens.

Commenter # - Comment #	Comment
5-42	Project planning should address the potentially deleterious impacts of any proposed action intended to reduce fire risks on habitat. For example, the Fisher may benefit from the large amounts of down woody material, which is likely to develop if existing late--seral trees and stands are not logged.
5-43	Studies conducted elsewhere in North America have documented that martens are sensitive to forest fragmentation and to thresholds in landscape scale characteristics (Bissonette et al. 1997, Hargis et al. 1999, Chapin et al. 1998).
5-44	Conservation biologists have suggested a focus on preserving the remaining late-successional forests and maintaining adequate habitat connectivity to ensure forest carnivore population viability (Noss et al.1997; (Kirk 2006 attached).
5-41	For the Pacific fisher, Humboldt marten, Northern Spotted Owl, and goshawk, it is imperative to maintain at least 60 percent canopy closure and retain all old growth and late successional character trees for resting and shelter. From the Zielinski studies canopy closure at rest sites were 60 percent or greater, and the trees were often larger than 24 in. dbh. Not logging Riparian Reserves helps the Fisher as well as they often forage and rest near water sources.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue is and will be addressed through project design and analysis. This has been analyzed in the draft environmental impact statement, Wildlife Report. The effects to fisher, NSO, marten, and goshawk are analyzed in the Resources Report and the Wildlife BE and Wildlife BA.

(26) Other Issue: The loss of habitat for “snag-related” Management Indicator Species as a result of logging and fuels reduction needs to be analyzed using population data to assess population trends and the effects of the project on these species.

Commenter # - Comment #	Comment
5-49	“Snag-associated” MIS species may lose habitat due to proposed logging units, in proposed landings, fuels treatment areas and along haul routes. Population numbers and trends have thus far not been analyzed by the agency.
5-50	To assert that “[c]ollecting population data is not a requirement” for imperiled [snag-associated] species and MIS is, essentially, to say that the KNF can legally manage the habitat on public lands on the basis of projections of what might, or ought, to be happening with respect to wildlife populations, without regard to what the facts might actually be. This cannot be correct. If the purpose of designating MIS is to use their population changes to assess the “effects of management activities,” then the Forest Service must actually attend to those population changes, which cannot be done without “collecting population data.” Therefore, assessing population levels, distribution, and trends is in fact critical to assessing not only the effects of management actions, but also to evaluating the accuracy of the habitat capability models which the agency uses to estimate the relationship between habitat and population levels for imperiled and MIS species.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue is and will be addressed through project design and analysis. The impacts of the project activities on snag-associated Management Indicator Species have been analyzed in the environmental impact statement and Wildlife Resource Report.

(27) Concern: Survey and Manage “equivalent effort” surveys must be done for treatments in Late-Serial, Old-Growth (LSOG) Stands

Commenter # - Comment #	Comment
5-52	The scoping notice contains no discussion or information whatsoever about the influence of surveys on project layout and design. The forthcoming NEPA document must disclose the timing, results and influence of surveys. Please be advised that pursuant to the 2001 S&M ROD the government placed some hard-to-survey species in a category that required strategic surveys by a certain date, and if/when that deadline was missed, the USFS is required to stop logging LSOG forests OR complete “equivalent effort surveys.” Currently Equivalent Effort Survey are required for Nine species: Lichens: <i>Bryoria subcana</i> , <i>Tholurna dissimilis</i> <input type="checkbox"/> Bryophytes: <i>Kurzia makinoana</i> , <i>Marsupella emarginata</i> v. <i>aquatica</i> , <i>Orthodontium gracile</i> , <i>Tritomaria exsectiformis</i> Mollusks: <i>Deroceras hesperium</i> , <i>Hemphillia pantherina</i> , <i>Monadenia chaceana</i> .

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. The project does not propose any activities in old-growth stands. The required surveys and the findings for Survey and Manage species will be discussed in the environmental impact statement and the Wildlife and Botany Reports. Additionally, the species *Bryoria subcana*, *Tholurna dissimilis*, *Kurzia makinoana*, *Marsupella emarginata* v. *aquatica*, *Orthodontium gracile*, and *Tritomaria exsectiformis* are not known or expected to occur on the Klamath National Forest because the Forest is either out of the species range or does not contain suitable habitat(refer to the Botanical Pre-field Review A-1).

(28) Other Issue: The effects of the project on Neotropical Migratory Birds, including cumulative effects, must be analyzed and disclosed in the draft environmental impact statement.

Commenter # - Comment #	Comment
5-53	The regional decline of migratory birds is a significant issue for this project. Numerous studies have reported local and regional trends in breeding and migratory bird populations throughout North America (e.g., DeGraaf 1995, Sauer et al. 2004). These studies suggest geographically widespread population declines that have provoked conservation concern for birds, particularly neotropical migrants (Askins 1993, Terborgh 1989.) The 2005 report from the Klamath Bird Observatory entitled Local and Regional Trends in Breeding and Migratory Bird Populations in the Klamath and Rogue River Valleys: Monitoring Results for 1993-2003 indicates that several species on songbirds are suffering declining population trends at the regional level. (Alexander 2005)
5-54	The forthcoming EIS for this project should analyze and disclose the potential impacts of conifer thinning operations and brush removal on neotropical bird population trends.
5-55	The cumulative effects analysis on migratory birds should not rely exclusively on Wilderness, Riparian Reserves and LSRs to provide for species viability into the future, because many Forest Service and BLM Districts are actively logging those land use allocations, regardless of the effects on migratory birds, despite their reserve status.
5-56	Simply concluding that the scale of the project is small, relative to the size of the forest, that migratory bird populations will not be affected will not suffice. As you know, the Spotted Owl was driven into threatened status by lots of "little clearcuts" that individually were insignificant, but cumulatively resulted in significant habitat loss.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue is and will be addressed through project design and analysis. The effects of the project on neotropical migratory birds has been analyzed in the environmental impact statement and Wildlife Resource Report. Relevant scientific literature will be considered in the environmental impacts statement and relevant resource reports. Migratory Bird Species were analyzed in the Migratory Bird Treaty Act Compliance Report for the Jess project. The Migratory Bird Treaty Act Compliance Report determined that the Jess project complies with the laws, policies and regulations of the Migratory Bird Treaty Act. The 2005 report from the Klamath Bird Observatory entitled Local and Regional Trends

in Breeding and Migratory Bird Populations in the Klamath and Rogue River Valleys: Monitoring Results for 1993-2003 indicates that several species on songbirds are suffering declining population trends at the regional level. For the Jess project, the long-term benefits to these songbird species (and their key habitats) are maintaining key migratory bird habitat components by the reduction of fuels loading, re-establishment of mosaic forest habitats, and improvement of stand condition, thereby reducing the risk of further, stand replacing wildfire. Project activities will provide short- and long-term beneficial effects to bird species (and their key habitats). Alexander (2005) was incorporated into the Migratory Songbird Report. Dugger (2011) and Forsman (2011) were incorporated into the Terrestrial Biological Assessment. Lindenmeyer (2012) and Olsen (2012) were not used because they are not applicable at the project scale. Merium (2003) was not used because it addresses thinning in owl cores, which the Jess project does not propose.

(29) Relevant Issue #2: Treating the Riparian Reserves, including with logging and fuels treatments, will reduce overstory and canopy and impact wildlife habitat connectivity.

Commenter # - Comment #	Comment
5-58	Some of the most productive, sensitive, and diverse sites are within Riparian Reserves. Riparian areas provide important habitat for fish and other aquatic life forms, as well as a variety of wildlife species, including the willow flycatcher, fisher and bald-eagle. Riparian areas have high wildlife values because of the close proximity of water and structural diversity of the vegetation. They provide a network of suitable habitat to include linkage in the form of dispersal habitat. How will this and other projects affect wildlife connectivity in Riparian Reserve's? Nearly all projects across Northern California Pacific Northwest national forests are "treating" and thinning in Riparian Reserves. The cumulative affects of this should be considered region wide, not only in terms of water quality but also in terms of habitat connectivity and effects to aquatic species.
5-59	Riparian Reserve's are extremely important for multiple reasons including serving as refugia and wildlife corridors. Any activity in Riparian Reserve's must be explained site-specifically in the forthcoming NEPA documents, including location, specific conditions, age class, and vegetation type to name a few. Overstory and canopy must be retained in order to provide characteristics associated with Riparian Reserve's. Please note extensive Riparian Reserve entry as a significant issue, especially in the context of cumulative effects.
5-60	Riparian management objectives include abundant dead wood and since logging will remove a large number of trees that can never be recruited as dead wood, this logging will retard attainment of ACS objectives in violation of the LRMP as amended by the NW Forest Plan. Logging in riparian reserves is generally prohibited by the NWFP. There is an exception where silviculture is "needed" to attain aquatic objectives, but there is no exception for logging intended to meet fuel objectives, especially given that the project area is not in need of treatment for fire risk reduction.

USFS Disposition: This is Relevant Issue #2 and was addressed by the development of alternative 3 in Chapter 2 of the draft environmental impact statement. The comparison of resource impacts between the alternatives including impacts to Riparian

Reserves, aquatic species, coarse downed wood, and Riparian Reserve dependent wildlife is in Chapter 2 of the draft environmental impact statement and in the resource sections of Chapter 3. The site specific condition and proposed treatments for each Riparian Reserve within treatment units in alternative 2 can be found in appendix A of the draft environmental impact statement. Alternative 3 has not treatments proposed for the Riparian Reserves. The need for the treatments is described in the Aquatic Conservation Strategy Objective analysis in appendix F of the draft environmental impact statement. The projects considered in the cumulative effects analysis vary by resource and the description of temporal and spatial boundaries of the cumulative effects can be found in the resource sections of Chapter 3.

(30) Other Issue: Avoid road and landing construction because they are environmentally destructive. If roads or landing construction is proposed, be specific about the locations and size.

Commenter # - Comment #	Comment
5-34	We urge the agency to avoid actions (such as landing construction, road reconstruction and commercial thinning) that will remove or downgrade suitable habitat for this federally listed species. We believe that logging activities (singularly and cumulatively) such as road and landing construction, Riparian Reserve entry, and 85% reduction in canopy is a significant issue.
5-89	We are concerned with the environmentally destructive effects of landings. Please be specific in the DEIS as to location, size and proposed needed construction. Especially because the project area is within Key watersheds, under HFRA authority and surrounded by NSO's we believe that landings would have a detrimental impact on multiple resources especially in conjunction with the large scale projects surround the Jess project such as the Petersburg Pines and Eddy Gulch Projects.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue is and will continue to be addressed through project design and analysis. No new roads will be constructed in action alternatives for this project. Potential landing construction areas will be identified; however, the exact landing location and size will not be known until implementation as these aspects of landings are subject to an agreement between the contractor and the USFS.

(31) Other Issue: The cumulative effects analysis for watershed health and wildlife habitat need to consider all past, present and reasonably foreseeable actions on both public and private lands.

Commenter # - Comment #	Comment
5-64	A thorough cumulative impact analysis of the proposed logging in combination with other federal logging and private logging activities should be included in the forthcoming NEPA document. Future, present and the past management actions must be disclosed and analyzed in a comprehensive cumulative effects analysis. We believe that the significant cumulative impacts from past road construction and federal logging have severely degraded the hydrological, soil, terrestrial habitat and connectivity values in the Salmon River watershed.
5-65	Because landscape level disturbance in these 303 (d) listed Key watersheds such as the Petersburg Pines, Little Conan, Eddy Gulch LSR and Caribou "Salvage" Projects which propose landing construction,, thousands of acres of ground based logging and skyline corridors, and entry into Riparian Reserves assumption and reliance on Best Management Practices (BMP's) and Project Design Features (PDF's) will not suffice in meeting CWA, NFP or Basin Plan Standards. The DEIS must adequately consider and disclose how the proposed action will fully comply with all applicable requirements.
5-66	The DEIS should give serious and careful consideration of the cumulative effects of the proposed actions (and alternatives) on soils, hydrologic function, habitat and wildlife in the context of past, present, and reasonably foreseeable future actions in the region.
6-68	The Jess project in addition to the Petersburg Pines project, Eddy Gulch and Caribou projects will affect habitat connectivity. The forthcoming NEPA document must address how these projects will collectively alter wildlife corridors from the Trinity Alps Wilderness to the Marble Mountain Wilderness.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue is and will continue to be addressed through project design and analysis. Cumulative effects will be analyzed and disclosed for the proposed action and alternatives in the environmental impact statement. Past actions will be incorporated into the existing condition for cumulative effects. A list of current and reasonably foreseeable actions will be generated for incorporation into the cumulative effects analysis of all resources. The EA and specialists reports consider the cumulative effects of the proposed actions (alternatives) on soils, hydrologic function, habitat and wildlife. Methodology for the affected environment and cumulative effects analyses are described in the introduction to chapter 3 and under each resource section. In addition, in the draft environmental impact statement, appendix F, Aquatic Conservation Strategy Objective #2 addresses connectivity values in the Salmon River watershed. The hydrological analysis provides the information required to demonstrate compliance with the Clean Water Act and the associated waiver requirements through the North Coast Region Water Quality Control Board. The Forest Service will apply for a waiver post-decision and prior to implementation; receipt of waiver approval from the North Coast Region Water Quality Control Board indicates compliance with Clean Water Act.

(32) Other Issue: Coarse woody debris and snags are an important component in a functioning ecosystem for many species of wildlife and plants. The project should be designed to maintain as much coarse woody debris and snags as possible to meet Land and Resource Management Plan (Forest Plan) standards and guidelines.

Commenter # - Comment #	Comment
5-71	We would like to reiterate the need for maintaining snags and accounting for snag recruitment. As per the LRMP, snag retention is based on a per acre requirement and is not at a landscape scale as stated in the scoping notice.
5-72	In general the contribution of very large logs (e.g., 20 inches in diameter, or larger) to fire severity and intensity is almost negligible, as they are the fuels least available for combustion. When these large logs do burn, it is because the smaller fuels needed to ignite them and sustain combustion are present. Logs also burn mainly by smoldering combustion, which is not considered in the calculation of fire intensity. This is the reason why relatively high fuel loads comprised primarily of large-diameter woody material can be present without eliciting high intensity fire effects.
5-73	Please be descriptive on current CWD/Snag status in units. CWD/Snags are an essential component of healthy forests and contribute to soil vitality and productivity, in addition to providing quality habitat for predator and prey species. The LRMP instructs the Forest to protect CWD to the fullest extent possible. Tractor-based yarding under the proposed action could affect CWD/Snag levels. Please also disclose the effects that activities will have on CWD/Snags. If snag levels are low, marking guidelines must reflect the need for considering future snag recruitment. We are concerned about harvesting snags along ridge tops and roads and how that may lead to habitat fragmentation. Please analyze this when preparing the DEIS.
5-74	Coarse woody debris is a necessary component of forest ecosystems. This wood provides habitat for a broad array of vertebrates, invertebrates, fungi, mosses, vascular plants, and micro-organisms. Arthropods, salamanders, reptiles, and small mammals live in or under logs; woodpeckers forage on them; and vascular plants and fungi grow on rotting logs. Provision for retention of snags and logs normally should be made, at least until the new stand begins to contribute coarse woody debris. Many natural disturbances do not result in complete mortality of stands. The surviving trees are important elements of the new stand. They provide structural diversity and provide a potential source of additional large snags during the development of new stands. Furthermore, trees injured by disturbance may develop cavities, deformed crowns, and limbs, which are habitat components for a variety of wildlife species. Disturbance is an important natural process in late successional reserves, because it allows for a greater range of tree sizes and types than could be achieved through intensive logging.

Commenter # - Comment #	Comment
5-75	Coarse woody debris is essential for many species of vascular plants, fungi, liverworts, mosses, lichens, arthropods, salamanders, reptiles and small mammals. Adequate numbers of large snags and green trees are especially critical for bats because these trees are used for maternity roosts, temporary night roosts, day roosts, and hibernacula. Large snags and green trees should be well distributed because bats compete with primary excavators and other species that use cavities. Day and night roosts are often located at different sites, and migrating bats may roost under bark in small groups. Thermal stability within a roost site is important for bats, and large snags and green trees provide that stability. Individual bat colonies may use several roosts during a season as temperature and weather conditions change. Roosting bats may also use large, down logs with loose bark. All large trees should be retained in late successional reserves regardless of whether they are diseased or not because they play important roles while standing, decaying and lying on the forest floor.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. The effects of the proposed action and alternatives on coarse woody debris and snags have been analyzed and disclosed in the environmental impact statement. Project design features were developed to protect coarse woody debris and snags. The project will meet Forest Plan standards and guidelines as will be addressed in the Forest Plan Consistency Checklist for the project.

(33) Other Issue: The project should comply with law, policy and regulation regarding soil productivity and logging effects.

Commenter # - Comment #	Comment
5-69	The Forest Service may only yard timber if the activity will be "carried out in a manner consistent with the protection of soil." 16 USC §1604(g)(3)(F)(v); 36 CFR §219.27(c)(6). Management plans and projects must "insure that timber will be harvested from National Forest System lands only where-"soil, slope, or other watershed conditions will not be irreversibly damaged." 16 USC § 1604(g)(3)(E)(i). By enacting this section, Congress intended that the Forest Service "provide empirical guarantees that timber harvesting will not damage soils, water conditions, and fish habitats."
5-70	Further, the NFMA regulations require the "conservation of soil and water." 36 CFR §219.27. Section 219.27(a)(1) provides that "[a]ll management prescriptions shall-[c]onserve soil and water resources and not allow significant or permanent impairment of the productivity of the land." Section 219.27(b)(5) provides that "[m]anagement prescriptions that involve vegetative manipulation of tree cover for any purpose shall-[a]void permanent impairment of site productivity and ensure conservation of soil and water resources." Further, [c]onservation of soil and water resources involves the analysis, protection, enhancement, treatment, and evaluation of soil and water resources and their responses under management and shall be guided by instructions in official technical handbooks." 36 C.F.R. §219.27(f).

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue is and will continue to be addressed through project design and analysis. Effects of the proposed action and alternatives on soil has been analyzed and disclosed in the draft environmental impact statement and Soils Resource Report. Soils are and will be protected by project design including project design features as will be discussed in the Soils Resource Report.). Soil resources are protected through project design features. Implementation of project design features will reduce the potential for negative effects from soil disturbing activities. The action alternatives will leave adequate soil cover, protect soil organic matter, and maintain soil structure at levels sufficient to protect soil productivity and prevent soil erosion. The acres that do not meet desired conditions will be minor compared to the total treatment acres in the project. These areas will account for minor portions of any one stand, so stand productivity will not be affected.

(34) Concern: The Sawyers Bar Community Wildfire Protection Plan (CWPP) must be incorporated into the project as a whole to best meet community protection from wildfire risk.

Commenter # - Comment #	Comment
5-89	The agency can not “cherry pick” only the portions of the CWPP that is useful to furthering their resource extraction tendencies. Please honestly consider all portions of the CWPP that the community, along with fire specialists, has developed.

USFS Disposition: This is a Concern because it does not meet the definition of an issue [3].The project incorporates the portions of the CWPP that are reasonable and applicable to the project area, including ingress/egress fuels reduction and the protection of the municipal watershed for the community.

(35) Other Issue: The project should include a climate change analysis. This analysis should include both the effects of climate change on the project and the effects of the project on climate change.

Commenter # - Comment #	Comment
5-91	Please be specific in the DEIS on the effects logging will have on climate change. There are multiple scientific findings that concur with the fact that our forests, especially Pacific Northwest Forests, are storing much of the nations carbon which are mitigating threats to the earth’s climate. Please also detail why it is important to retain dense stands on north and east facing slopes in regards to climate change as these areas will provide the highest amount of refugia for plant and animal species as described in these excerpts from Olsen 2012 (attached).

Commenter # - Comment #	Comment
5-92	Every decision subject to NEPA should recognize climate change as a reasonably foreseeable event and should carefully consider and analyze the issue of climate change from two perspectives: first, the cumulative effects of the proposed action plus the anticipated effects of climate change on the resources directly and indirectly affected the proposal, and second the extent to which the proposed action will tend to mitigate or exacerbate climate change by directly or indirectly emitting or sequestering greenhouse gases from both fossil deposits and the biosphere. This will help meet the objectives of NEPA by leading to more informed decision making all levels of government. See Petition Requesting That The Council On Environmental Quality Amend Its Regulations To Clarify That Climate Change Analyses Be Included In Environmental Review Documents. The International Center for Technology Assessment, NRDC, Sierra Club. February 28, 2008. http://www.airportattorneys.com/files/Intl%20Ctr%20Petition%20on%20CEQA.pdf
5-93	The NEPA analysis should start with an accurate and up-to-date inventory of carbon storage and carbon flows on federal land. This is required by both the National Forest Management Act (16 USC §1601(a)(1)&(2)) and the Federal Land Policy & Management Act (43 USC §1711(A)).
5-94	The NEPA analysis should disclose and consider that logging has several adverse consequences on GHG pools and flows: <i>[see list 1-4f in comment letter]</i> .
5-95	The agency should fully mitigate for the effects of increased warming due to carbon emissions that result from logging for the full time period that the logging alternative stores less carbon than the no-logging alternative.
5-96	As stands develop from young to mature to old they recruit large amounts of material from the live tree pool to the dead wood pool, which continues to accumulate large amounts of carbon for centuries. Logging, even thinning, captures that mortality and can dramatically affect the accumulation of carbon in the dead wood pool.

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. This issue is and will continue to be addressed through project design and analysis. Climate change has been analyzed within the environmental impact statement and relevant scientific literature will be considered in the environmental impacts statement and relevant resource reports.

(36) Other Issue: The Forest Service should undertake a species specific study to assess the impacts of climate change on ecosystem health.

Commenter # - Comment #	Comment
2-10	EPA also encourages the Forest Service to include in the DEIS the results of the projects cumulative impacts with climate change and subsequent rising temperatures. EPA recognizes that forests in California are already

Commenter # - Comment #	Comment
	experiencing higher temperatures. We encourage the Forest Service to do a species specific study accessing increased vulnerability of species in the project area from climate change and evaluate present species propensity for shifting to more suitable range elevations e.g. suitable habitat, as temperatures change. The findings of such a study should be considered when planning timber harvest and restoration efforts. For more information on climate change and risk to plants and wildlife go to: http://www.energy.ca.gov/2008publications/CEC-500-2008-077/CEC-500-2008-077.PDF

USFS Disposition: This is an Other Issue because it is regarding a procedural concern [2c]. Climate change has been addressed in the environmental impact statement however a species specific study to assess impacts of climate change is outside the scope of this project. The best available science has been used to assess the effects of climate change but the development of new datasets for this assessment is outside the scope of this project.

(37) Other Issue The Forest should consider a wide-range of alternatives that meet the project's purpose and need and minimizes the impacts to forest resources.

Commenter # - Comment #	Comment
2-3	The DEIS should consider a reasonable range of alternatives that include different covered activities in addition to different covered species, and land coverage. In addition, we recommend selection of an alternative that maximizes avoidance of impacts to covered species and other environmental resources in the project area. EPA supports clear, obtainable and effective mitigation measures that prevent negative environmental impacts and compensate for unavoidable negative environmental impacts to the affected area. EPA also supports the permanent conservation of high quality habitat and restoration of degraded habitat in order to support the preservation and recovery of the covered species.

USFS Disposition: This is an Other Issue because it is already decided by law, policy and regulation. The decision for this project is authorized under the Health Forest Restoration Act which requires only a no action alternative and one action alternative. However, because of comments received from the public there are eight alternatives analyzed for the Jess project: three alternatives analyzed in detail and five alternatives considered but eliminated from detailed study (see Chapter 2).

(38) Concern: Biological surveys should be completed for the project area and consultation with the appropriate regulating agencies should be undertaken early in the project planning. Activities that will negatively impact threatened or endangered species should be reconsidered or mitigated.

Commenter # - Comment #	Comment
2-4	EPA encourages the Forest Service to include in the DEIS the results of a comprehensive biological survey of the Project area. Without such a survey, it would be difficult to accurately evaluate the environmental impacts of the proposed action. We encourage Forest Service to relocate, reduce, or eliminate portions of the project footprint that would adversely affect threatened, endangered, or candidate species or their potential habitat. EPA recommends that the results of consultation with the United States Fish and Wildlife Service and National Oceanic and Atmospheric Administration, if appropriate, regarding threatened or endangered species or critical habitat should be included in the DEIS.

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. Surveys required for endangered or threatened species will be completed per the appropriate protocols required by regulations and agreements with regulatory agencies. Consultation with the appropriate regulating agencies has been completed. Impacts to threatened or endangered species will be analyzed in the Wildlife Resource Report and Biological Assessment. Project design features are built into the project design to minimize negative impacts.

(39) Concern: The use of temporary roads on existing roadbeds should be disclosed and a plan to open and hydrologically stabilize [decommission], including a timeline, should be in the environmental documents. The hydrologic stabilization should consider scarification, seeding, and blocking the takeoff.

Commenter # - Comment #	Comment
2-8	The project design calls for the decommissioning and restoration of roads. The DEIS should include a plan with a list and map of the roads, landings and trails that will be impacted by the project. This plan should include specific information on the extent to which these roads and landings would be recontoured, replanted with appropriate vegetation, monitored, and closed to off-highway vehicle use. We recommend the DEIS include a specific post-harvest schedule for closure of the temporary roads and landings. The DEIS should commit to scarifying the surface of roads, landings, and trails selected for decommissioning to break up compacted soils, seeding such areas with native vegetation, and blocking vehicle traffic with rocks and or barricades.

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. The use of temporary roads on existing roadbeds has been discussed in the environmental impact statement and analyzed as part of the proposed action. Project design features address how and when the roads will be hydrologically stabilized relative to the implementation of the project.

(40) Concern: The project should comply with Section 106 of the National Historic Preservation Act and include the local tribes early in the planning process.

Commenter # - Comment #	Comment
2-9	EPA encourages early coordination with local tribes in accordance with Section 106 of the National Historic Preservation Act. Five federally recognized tribes in the Klamath Watershed may have an interest in the proposed action and the Karuk Tribe and Quartz Valley Indian Reservation may have a strong interest based on the location of the proposed action. For more information on tribes Timothy Wilhite, Tribal Liaison with our office can be contacted at (530)-841-4577, or by email at twilhiteepa.gov.

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. The project is compliant with the National Historic Preservation Act and the project has been shared with the Karuk Tribe and Quartz Valley Indian Reservation, the local federally-recognized tribe and federally-recognized reservation (respectively), at the regular meetings.

(41) Concern: Fuels treatments should focus on strategic places on the landscape where minimal effort and cost will yield the largest benefit. The focus of fuels reduction should not be on attaining low fire severity over the entire landscape but to make the use of natural ignited wildfires on the landscape safely.

Commenter # - Comment #	Comment
5-79	<p>The central conclusion of the paper [Odion et al 2004] is that long absence of fire predicts low-severity fire effects in Klamath mixed evergreen forests. This conclusion has four management implications:</p> <ol style="list-style-type: none"> 1. The fuel build-up model formulated for southwestern ponderosa pine forests does not apply to Klamath mixed evergreen forests, and fuel treatments intended to prevent crown fires based on this model are misdirected. 2. Fuel treatments designed to impose a low-severity fire regime may be ecologically detrimental because highly severe fire effects, to some degree, support diverse vegetation community structures and habitats for which the Klamath region is globally unique. Some fuel treatments also may adversely affect soils, water quality, wildlife habitat, and spread noxious weeds. 3. Fuel treatments may be ecologically beneficial in tree plantations where past logging left behind unnatural fuel profiles. 4. Naturally ignited wildland fires may be beneficial to a variety of conservation objectives in Klamath forests. Home ignitability mitigation in the wildland-urban interface may increase options for backcountry wildland fire use. <p>The direction of fire spread (backing, flanking, heading) is an important aspect of fire behavior because fires interact with weather, topography and vegetation to back and flank around certain conditions or head through others as they move across a landscape (Graham et al. 2004).</p>

Commenter # - Comment #	Comment
5-80	Implement fuel reduction first in areas where relatively little resource investment may be able to create relatively fire-resilient stand conditions. This may include low-productivity sites with little encroachment of small trees (e.g., dry southerly aspects) and open stands dominated by large conifers or hardwoods (e.g., existing fuel breaks). Targeting initial work in these areas will maximize the area to be treated with available funds and personnel, and thereby provide the greatest opportunity to quickly reduce fuels and restore ecosystem function at larger spatial scales. In a mixed conifer forest in the South Fork Trinity River watershed in northwest California, partially thinned stands burned more intensely and suffered higher levels of tree mortality than unlogged areas after wildland fires burned them (Weatherspoon and Skinner 1995). In eastern Washington, thinning that was intended to reduce fire hazard had the opposite effect, as logged areas showed increased rates of fire spread and greater flame lengths (Huff et al. 1995). Thinning treatments in the Rocky Mountain Front Range failed to prevent high intensity fire from overwhelming suppression forces and threatening residential communities outside Denver, Colorado (USDA 2002). Those anecdotal findings confirm other research indicating that tree thinning and biomass removal alone are unlikely to effectively reduce fire severity in dense forest stands (Graham et al. 2004, Van Wagtendonk 1996).
5-82	The complexity created by variability in fire regimes defies a one-size-fits all management prescription.
5-83	Restoration is warranted where fire exclusion has led to substantial alterations in ecosystem qualities.
5-113	We urge KNF managers to learn from the past and to address these [Frost 2000] scientific findings in the DEIS.

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. This issue was addressed through project design. The project design uses fuels treatments along strategic ridges and existing fuel breaks. The focus is to protect the municipal watershed of the Sawyers Bar Community and to allow for direct firefighting resources to better protect Sawyers Bar should a wildfire occur. The Forest plans to maintain the current Fire Return Interval and utilized fuels treatments to mitigate fire severity as is suggested by Odion et al 2004.

(42) Concern: Post-fire logging and seeding has no ecological benefit.

Commenter # - Comment #	Comment
5-84	Post-fire logging usually has no ecological benefits and many negative impacts; the same is often true for post-fire seeding

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. The project does not propose any post-fire logging or seeding so this topic is outside the scope of the project.

(43) Relevant Issue #5: Develop an alternative that would keep at least 60% canopy, not enter Riparian Reserves, concentrate on thinning small diameter trees in plantations, and use fuels treatments to protect old-growth and northern spotted owl habitat. This alternative would minimize large tree removal, landing construction, and excessive ground-based logging .

Commenter # - Comment #	Comment
5-97	Please do consider an alternative that: would keep at least 60% canopy as recommended in the CWPP and/or not enter into Riparian Reserve's (except in plantations) widths detailed in the ACS. We would welcome a project by the agency that concentrates on thinning of small-diameter fire-suppressed stands, especially plantations, as well as the proposed fuels treatments as a means towards protecting forest health and old-growth characteristics and NSO habitat where timber volume can be a byproduct of variable density thinning aimed at truly restoring fire-suppressed stands.
5-98	We urge the agency to work with us to develop a project that promotes the historic species composition and fire regime and maintains and restores forest structure and NSO Critical Habitat while avoiding the adverse environmental affects associated with large tree extraction canopy reduction, continuous Riparian Reserve entry and landing construction and excessive ground-based logging.
5-104	Brown, et al, (2004)- In a section on mixed severity fire regimes, the author discusses the importance of key habitat areas provided by large old trees. This is also important for the discussion of habitat provided by large old snags, as efforts taken to remove them are detrimental to forest health:

USFS Disposition: This is a Relevant Issue. This will be an alternative not analyzed in detail (alternative C, page 5). It does not meet the ecological restoration portion of the purpose and need of the project. The mistletoe infection rate would continue to climb without the removal of heavily infected overstory. The removal of only small trees in plantations would not encourage hardwoods in the project area or restore the ponderosa and sugar pine dominated ridges that were historically present in the project area.

(44) Concern: There is interest in multi-party monitoring for canopy, owl response, vegetation, and Best Management Practices.

Commenter # - Comment #	Comment
5-99	We would like to express interest in monitoring so that monitoring, such as canopy, owl response, vegetation response, BMPs, effectiveness and implementation monitoring can be considered in the planning documents. We would like to voice our concerns with the loss of continuity from planning to contracting to implementation. We would like to see that project planning is well thought out and consistent from start to finish.

USFS Disposition: This is a Concern because it does not meet the definition of an Issue [3]. Multi-party monitoring will be considered and discussed as the project moves forward.

(45) Statements of Support

Commenter # - Comment #	Comment
2-1	EPA acknowledges the importance of the Jess Project (Project) goals to improve forest health and create better access for fire suppression activities during fire events. We support the use of prescribed underburning as an important measure necessary to reduce the risk of fire, promote biodiversity, and restore natural ecological processes within the forest. We recognize the ecological significance of the Klamath National Forest and encourage the inclusion of resource protection measures in the Draft Environmental Impact Statement (DEIS).
3-21	We feel this project needs to treat as many acres as possible in order to fully meet your designated purpose and need. We encourage you not to reduce the project (total acreage, total volume, and volume per acre) any further.
3-24	AFRC wants to go on record in support of the Jess Project. Thank you for the opportunity to comment on the proposed project and please keep us informed on the progress of NEPA. We are also interested in any additional field trips that may be set up for this project.
4-4	Further, CFA applauds the Forest for recognizing that strategically-placed shaded fuelbreaks on the landscape is a core component to vegetation management in the Klamath Mountains to reduce size and intensity of wildfires. We believe, again, starting with an 18% canopy cover on the ridgetop as a start point to design would make good sense.